GIS MULTIMEDIA TOOL FOR SIGNIFICANT WARS FROM 1950 TO PRESENT

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In Partial Fulfillment

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in

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_____

by

Darshini Hemang Gajab

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DEDICATION

I thank my family and faculty of Computer Science Department at SDSU for their valuable inputs and constant support towards my accomplishment of Masters in Computer Science. I dedicate my work to my father Mr. Hemang Gajab, my mother Mrs. Arati Gajab for their continuous encouragement and belief. I also thank my siblings Dwiti and Kunal for their never ending good luck.

ABSTRACT OF THE THESIS

GIS Multimedia Tool for Significant Wars from 1950 to Present
by
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The motivation of this software is to develop an interactive GIS application which should enhance student activity and interest in learning world history. It is an all-in-one graphic interface tool to help students of Helix High School understand and learn about significant wars in an informative but entertaining way.

This tool is designed to show the wars information in a student friendly format using text, pictures, videos, and quick links to learn from the Internet. The tool with its interactive and visually attractive GUI should motivate students to learn about the wars which were fought from 1950 to present, such as Afghanistan War, Gulf War, Korean War, Vietnam War and Cold War. The tool should mainly highlight the main groups involved in the war, causes, long term consequences, and results of the war. It also incorporates picture game and practice quizzes to provide students an opportunity to exercise what they have learned. The tool also provides capability of creating new quizzes for the students. GIS technologies like MapObjects - JAVA edition and j2sdk were used along with the NetBeans IDE to develop this tool.

This Thesis project was done in a group consisting of two students by Darshini Gajab and Chintan Sheth, who covered wars from 1775 to 1950. The advantage of a team approach is a commonality of treatment of all important wars from 1775 to the present.

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CHAPTER 1

INTRODUCTION

Many students find history hard to read and boring. Reading wrong material can reduce the interest in learning history. If the students get the right book or source then history reading can be fascinating. It can also be a challenge for the students from different countries to understand history of some other country and so chances of their losing interest is more.

There have been many methods employed for imparting education, from passing down of knowledge verbally to the use of books, chalk boards, and more recently the use of technology such as personal computers and the Internet. Electronic teaching has been one of the most important mediums adapted since the increase in the use of computers and the Internet.

The purpose of GIS Multimedia Tool for Significant Wars is to provide children and teachers of Helix High School with an interface that can aid in the learning about main events of the wars from 1950 to Present in a friendly format using data, pictures, videos and links to learn from the Internet. This tool provides the geographical location of major battles, their causes and consequences and conclusion in a visual format which should make learning history interesting. GIS tool provides a simple method to use for the high school students and they can exercise their knowledge with fun quizzes and picture games. Children can interact with the tool to explore these features and learn about them.

ESRI (Environmental Science Research Institute) has an outstanding presence in the field of GIS (Geographic Information Science). MapObjects is a suite of Java-based developer components for creating client or server-side mapping and GIS applications [1]. The release of MapObjects Java Standard Edition allows a developer to build custom map applications using the open standard Java programming language. Software developers can extend the basic map functionality to meet required capabilities to satisfy the end user. So this GIS multimedia tool has been developed using Java, and MapObjects, as a software platform.

This thesis has been organized in twelve chapters; the Chapters 1 and 2 are regarding the Introduction and the technologies we have used for developing the tool. Chapters 3 and 4 focus on requirements from Helix High School and the prototyping to achieve the final result. In Chapters 5 and 6 the class diagram of the tool, tool implementation and the functionality in brief are described. Chapters 7 and 8 shows the various GIS tools provided by MapObjects and the customized toolbar used for enhancing user experience. Chapter 9 is all about the map layers we are using in the GIS multimedia tool. Chapter 10 describes some additional tools developed for the application. The Chapter 11 talks about the user manual for the tool. The Chapter 12 covers the future enhancements possible to add more controls and features to the tool; these features will enhance the tools usability and capability to entice kids to use it.

CHAPTER 2

TECHNOLOGY

This tool has been developed using Java and MapObjects Java Edition. Both technologies are huge to be discussed at length. In this chapter we will focus on the benefits of the technologies used and their key areas.

2.1 JAVA

The biggest advantage of Java is that it integrates well with MapObjects Java Edition. Java's platform independence was an added advantage in selecting Java as the development language. As stated in Java language white paper by Sun Microsystems: "Java is a simple, object-oriented, distributed, interpreted, robust, secure, architecture neutral, portable, and dynamic." Following are some of the advantages of Java:

- Simplicity and ease-of-use: Java draws its roots from the C++ language. C++ is widely used and very popular but it is regarded as a complex language. Java, on the other hand, is closer to a "pure" object-oriented language. Java is easy to learn, write, compile and debug since it's similar to C++.
- Java is robust: Robust means reliable, and needs less maintenance after the implementation. Java compilers are able to detect problems that would usually show up during execution time in other languages.
- Java is platform-independent: Program once, Run anywhere (Platform Independence). Most programming languages are designed for a specific operating system and processor architecture.
- Java is object-oriented: An object-oriented language deals with objects. Objects contain both data (member variables) and code (methods). The code and the classes can be extended and re-used for further enhancements to the application.
- Java is interpreted: Java is an interpreted language. An interpreter is needed to run Java programs. First the java program is converted to bytecode i.e. machine readable format, and can be run on a Java Virtual machine (JVM). The bytecode is machine independent and is able to run on any machine that has a java interpreter. Also Java programs need only be compiled once, and the bytecode generated by the Java compiler can run on any platform [2].

  Java is used as a development language because of its simplicity and elegance.

2.2 MAPOBJECTS JAVA EDITION

MapObjects Java Edition is a collection of embedded mapping and GIS components. MapObjects can be used to develop various applications that include GIS functionalities and live dynamic maps. MapObjects Java Edition (MOJO) is a powerful collection of client and server side components that aids developers to build custom GIS applications. MapObjects plugs directly into various programming environments, allowing one to build applications quickly.

MOJO comes with a suite of high-level visual Java Beans components which can be integrated with multiple IDE's. Dr Carl Eckberg teaches a class at San Diego State University which covers MapObjects in depth and has published a comprehensive guide to using MapObjects which was one of the main criteria for choosing MapObjects.

For the development of the thesis MapObjects was integrated with the NetBeans IDE; details on how to integrate NetBeans IDE with MapObjects can be found in Chapter 6. MOJO is not an end user application; it's a developer's tool kit. It includes a set of JAR files containing pure Java components that can be used to develop a usable stand-alone GIS application or to add maps or map functionality to other applications [3]. Key features as cited from the MapObjects Java Edition brochure provided by Dr. Carl Eckberg which can be found at [4] are following:

- Using MapObjects Java Edition we can easily create applications that have different layers, with usefully functional toolbars. These applications can be created with the help of existing examples.
- Major GIS capabilities such as labeling map features, specifying projection, displaying thematic map layers, performing geometric processing, zooming and panning map layers, measuring distances, querying spatial data and creating layouts etc.
- Access to ESRI's ArcIMS web services, as well as building map application for distribution over the Internet through simple applets or JSP and servlets.
- Develop helpful tools for building a user interface. By using the rich Swing components included with MapObjects Java Edition, you can quickly build applications that include functional toolbars, query dialogs, overview and insert maps, and intelligent legends that make your custom applications easy to use and even easier to develop.
- Any Java IDE can be used for building a MapObject Java based application. This means that we can write java applications in IDE such as NetBeans and we can edit, compile and run that application there.

- In addition to the major feature listed above, MOJO includes many helpful tools in the development kit. Using swing components of MOJO, you can build Table-of-Contents, helpful toolbars, map overview and map legends.
- One can easily distribute MapObjects Java Edition applications over an Internet or intranet through browser hosted applets or simplify web delivery of your application with the use of Sun Java web start technology, the industry standard launching mechanism for distributing Java applications over the web.
- MOJO supports different file formats like ESRI's Shape File, ESRI's ArcSDE layers, ESRI's ArcIMS image and feature services, standard image formats comprising BMP, TIFF, JPG, GIF, and PNG.

CHAPTER 3

THE REQUIREMENTS

GIS Multimedia Tool for Significant Wars 1950 to Present has been developed for the use by Helix High School history students. The major requirements were set by Dr. Richard Sutton from Helix High School. The thesis has been developed under the supervision and guidance of Dr. Carl Eckberg from Computer Science Department, SDSU. Some enhancements were also implemented upon the request of Dr. Skupin from Geography Department, SDSU. The requirements gathered have been classified into; Data requirements, Platform requirements, Functional requirements and Student Centric requirements.

3.1 DATA REQUIREMENTS

The data requirements were gathered from Prof. Richard Sutton in order to have accurate information pertaining to the war. He helped in identifying important battle and information to be displayed for each war. How the display of data is reflected in the tool is described in the Functional and Student Centric Requirement sections.

Each war would cover the following information: Introduction of the war, causes of the war, main events of the war, consequences of the war, images and videos for the war.

Each battle event would cover the following information: Battle Name, Battle Place, Battle Time, causes of the battle, short description, generals involved and belligerents (countries) involved.

3.2 PLATFORM REQUIREMENTS

The platform requirements refer to the OS and the technologies used for developing the tool. Although this tool is platform independent, the implementation was done using Windows Vista platform. Java was used as the development language with MapObjects Java Edition as the GIS solution. The reason behind using these technologies is to have uniformity in the projects developed for Helix High School.

3.3 FUNCTIONAL REQUIREMENTS

The functional requirements refer as to what the tool should functionally do. The functional requirements which should be in the tool were gathered from Mr. Richard Sutton and Dr. Carl Eckberg:

- A login screen should appear before using the tool.
- A student user should be able to select a war from the selection menu and then view locations of the battle sites displayed on the map and the participants involved in the war. The student should also be able to select the options panel and learn more from the web page created for each war and also learn more from the Internet from sources such as Wikipedia. The functional constraint was that the student should not be able to use the Create Quiz and Take Quiz options in the Options panel.
- The tool should be capable of labeling the war battle sites and clear the labels.
- While giving more information about the war through images the student should be able to enlarge the image when he takes the mouse cursor on the image.
- The student should be able to clear and again add the participant countries in the war.
- The student should be able to select an option to view different wars.
- The tool shall provide tools to zoom in and zoom out and it should be capable of adding more layers to the map.
- The student should get information about the tool when he takes the cursor onto any of the tools in the toolbar.
- Hotlinks: Creating hotlink is a mandatory requirement. Selecting the hotlink icon and clicking on the battle sites, it should open a window giving information about the selected battle site.
- Hyperlink: This should allow student to go to external links to get more information about the battle.
- The tool shall have a picture game by which the student can exercise the knowledge he read about the wars.
- An administrative account (i.e. professor) should be able to perform all the functionalities which a student can do. Also, administrator should be able to add and delete student from the system.
- Admin should be able to create a quiz and then save it onto local drive. The admin should be able to open and print the saved quiz whenever he wants.
- Any user account should be able to log out from the system with the logout button and login back into the system
- The tool should provide a Help facility so that users are able to find their way out if they are having hard time in using tool.

3.4 STUDENT CENTRIC REQUIREMENTS

As the system is developed for the Helix High School students, these requirements were of prime importance. The requirements were suggested by Prof. Richard Sutton.

- The language and format used for the wars and important battles fought should be simple and informative. This was the very mandatory requirement.
- The tool should be easy to use for students and easy to configure for faculty (including easy installation of tool).
- The students who would be naïve and haven't used software before, the software should have tooltip and help facilities.
- Effective use of images and videos to make learning about the wars more interactive and informative.
- Picture games and quiz will help the student to test their knowledge about the wars they have learned with using the system.

All these requirements were finalized discussing periodically as we graduated in the development of the tool.

CHAPTER 4

PROTOTYPING

The best way to make sure that the requirements have been understood correctly, and both the developer, and the client are on the same page, is to prototype the product and demo it to the client. The prototype also provides a visual feedback to the client that can be used to generate more ideas and understand how their requirements would be implemented.

Prototyping the development cycle of your project helps in reduces the risk during implementation and adaption of the software tool. The software development life cycle can be subdivided into four phases as shown in Figure 4.1, which is explained in brief below:

- Definition and Requirement Collection: Understanding requirements plays a crucial role in creating any software product. A clear definition of requirements is essential in designing the tool. In the previous chapter we already mentioned the requirements gathered. After this phase, we would have a clear definition and image of the requirements needed to develop this Multimedia GIS tool for significant wars.
- Design: In this phase, using the specifications provided we can design the project; the functionalities and GUI the user expects will help in designing the outer layer of the project. It also includes the implementation and testing of software code which is ready for deployment.
- Development: This phase consists of developing the actual tool by writing code, implementing tool as per the requirements gathered. Initially small modules of different functions are implemented and then these small units are integrated to form a system. This process goes on until the project is ready to deliver. I found this process very helpful to keep track of the requirements and implementation of the project. Testing the modules at each step of implementation enhances less error rate and is easy to keep track of the actual requirements.
- Deployment and Maintenance: The actual deployment starts after the code is appropriately tested and all other aspects of the project including documentation, has been taken care of. Documentation and writing user manual is an important part in this phase.

The figures below show the screen shots of the prototype. The screen (Figure 4.2) is the main screen which is launched when the tool is started.

Figure 4.3 shows the create sample quiz prototype. It is an exercise that students can practice. The quiz can also be configured as a graded quiz by the professor while creating the

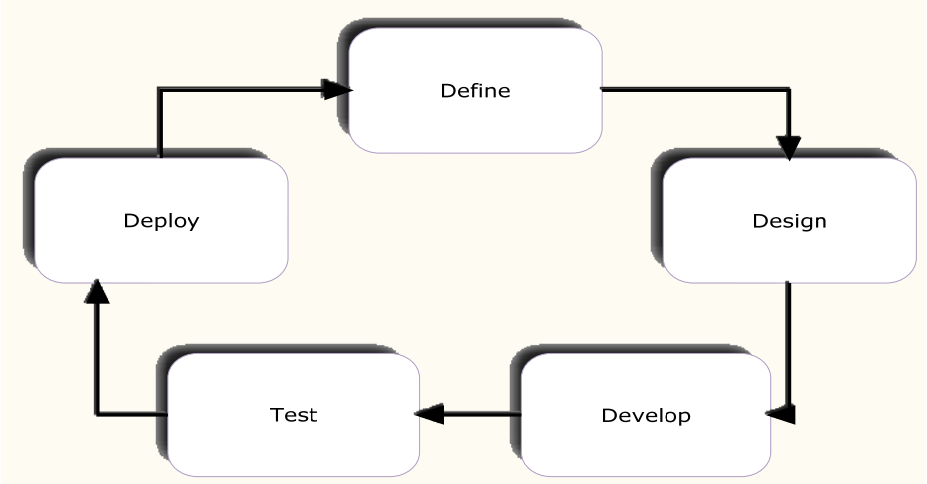

Figure 4.1. Project development cycle.

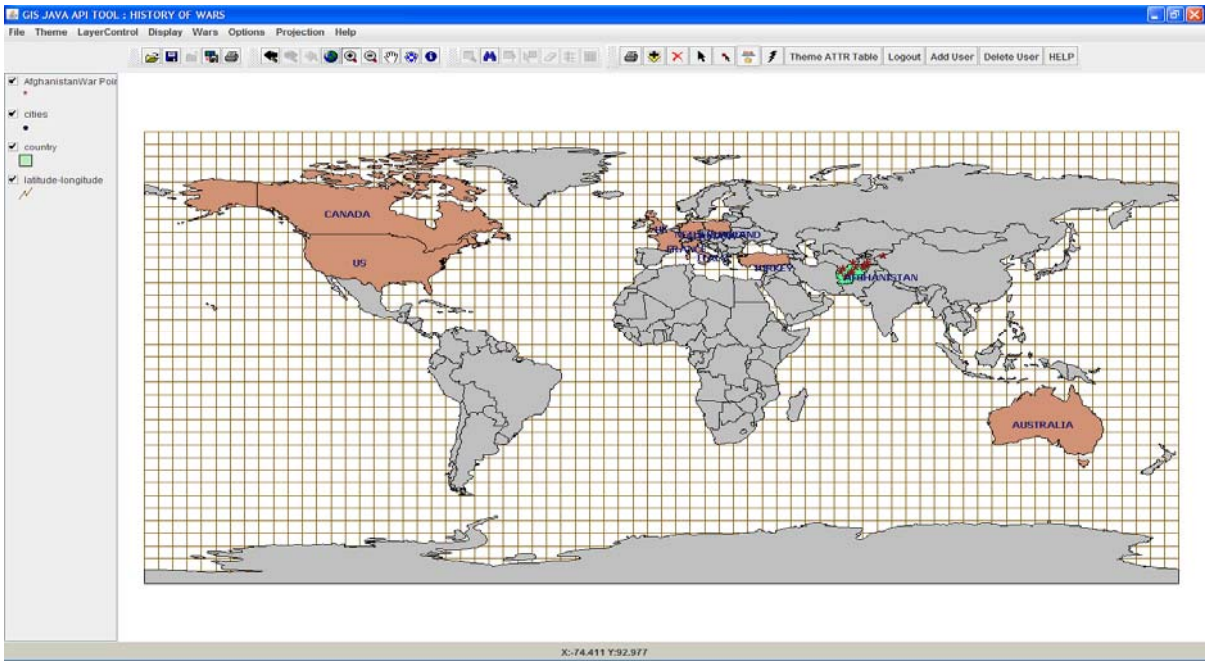

Figure 4.2. GIS multimedia tool main screen.

quiz. The Feedback of correct answers is given to the student so that they can see the correct answers to the wrong ones and can learn again by seeing the map.

On clicking the Create quiz option, the admin is prompted for faculty password. By entering a correct password, the create quiz web page is displayed with the features to enter the question, answer options and corresponding feedback to answers. Professor can click add question button to add question to the quiz. After all questions has been added to the quiz, he

Figure 4.3. Create quiz screen.

can click the make quiz button. The professor can add images and links to the question by using the add image and add link button. When the professor clicks the make quiz button, the quiz is displayed on the screen. The professor can then print the quiz or just view it. The user is prompted to save the quiz to the local drive with desired filename which can aid the professors to open or print the quiz later when needed.

Figure 4.4 shows the take quiz screen. This option is only available to the admin. When the admin clicks on the take quiz option, the user is prompted for faculty password. On entering a correct faculty password, the select quiz window is displayed. The professor selects the war and clicks Select button. All the quizzes created for that particular war are retrieved in the drop-down list. The professor selects the quiz from the drop-down list and clicks the open button to open the quiz or print button to print the quiz. The user can click the cancel button to exit the quiz window.

Figure 4.5 is the configured screen of GIS Multimedia Tool for Significant wars which includes labeled states and an Option Panel for detailed information about the war, Creating and Taking Quiz and Picture game for the students. This screen can be configured from the theme menu items of Menu bar. The countries who won the battle are shown as Brown in Figure 4.5 on the map and the countries who lost the battle are shown as greenish on the map.

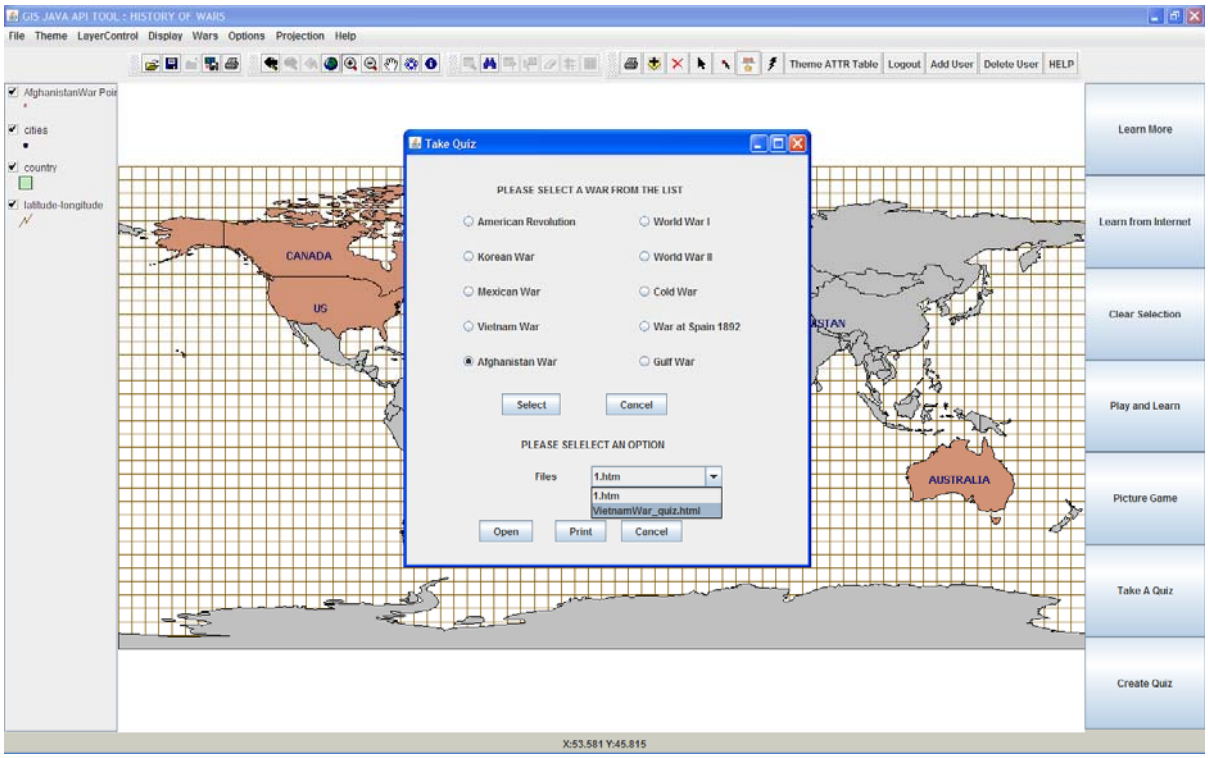

Figure 4.4. Take quiz screen.

Figure 4.6 shows a screen shot of a picture game, which asks the user to identify the picture of one of the generals involved in the War. The user has to select one out of four answers and if the answer is correct it then gives feedback and a brief description about the general, but if the selection is wrong it asks the user to try again.

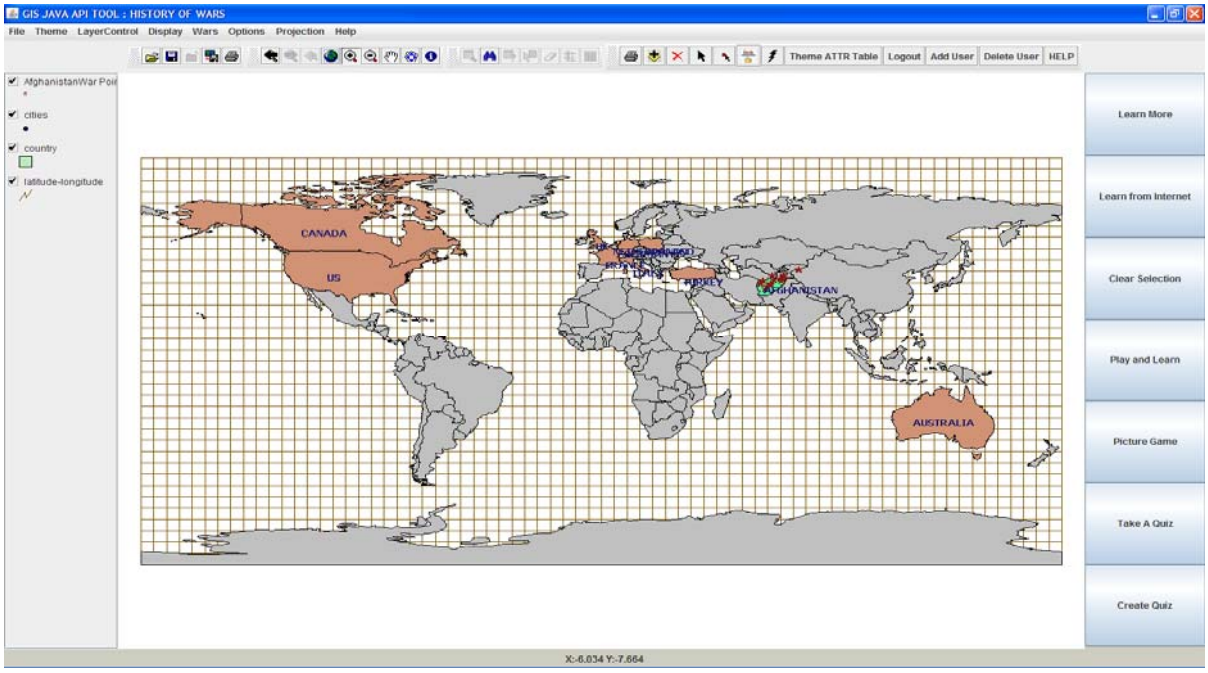

Figure 4.5. GIS multimedia tool with battle sites and options panel.

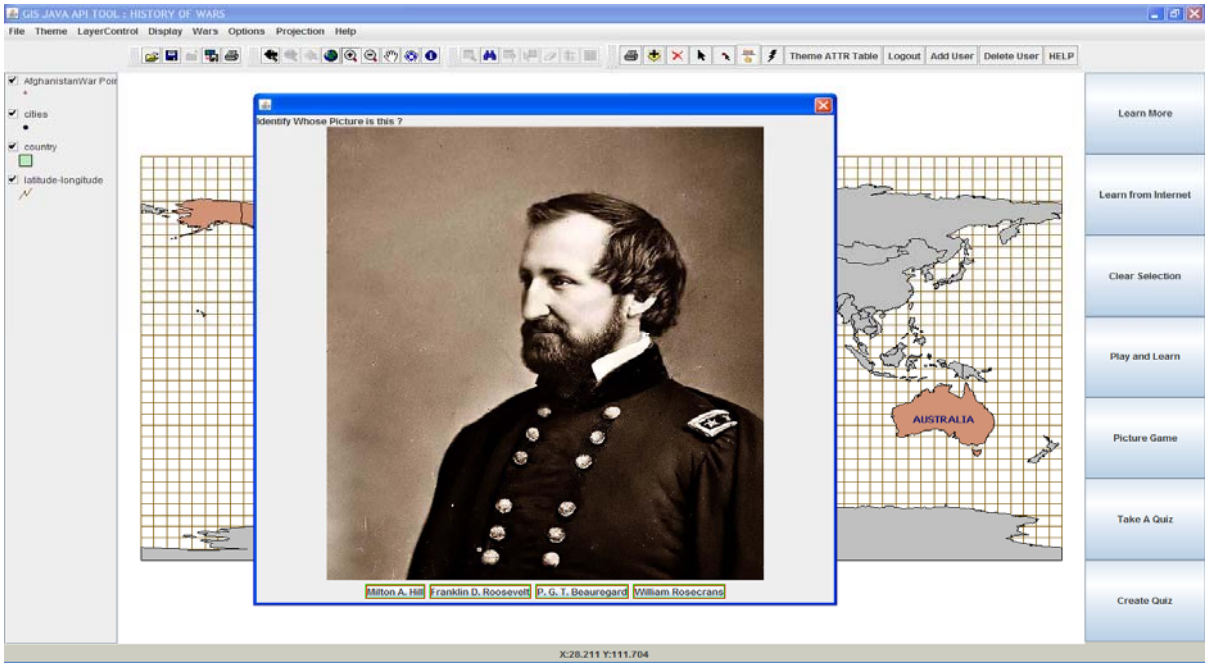

Figure 4.6. Picture game screen.

CHAPTER 5

SOFTWARE DESIGN

This chapter covers the detailed architecture diagram. The software design covers Architecture diagram and the Class diagram. The requirements were finalized and understood and then an in-depth formal design was created for GIS Multimedia Tool.

5.1 ARCHITECTURE DIAGRAM

Figure 5.1 depicts the architecture diagram for the GIS multimedia tool.

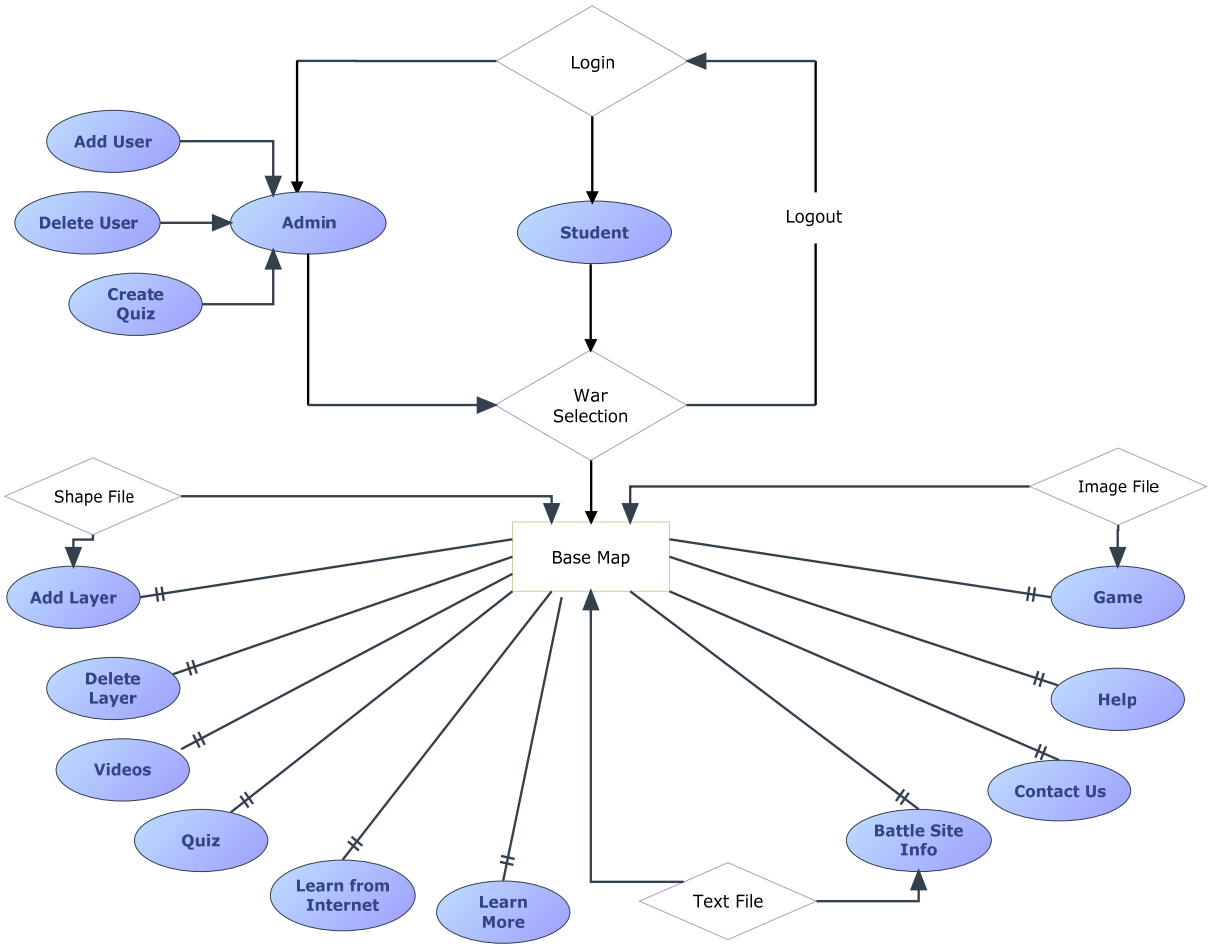

Figure 5.1. High level architecture diagram.

The architecture is broadly divided into three different levels:

- MapObjects and Java Classes: The functionality of all the buttons, custom toolbar and default GIS toolbars are defined in the java classes created.
- User Interface: The default map screen shall have menu options to display and clear battle sites, add and hide participant countries, add user and delete user facility, Help window, option to select and change war, Map object and custom toolbars and buttons to launch the picture game, create quiz, take quiz, learn more, learn from Internet options.
- Resources files: The default user interface uses the above classes for accessing the different resource files such as shape files, images, videos, text files and help documentation.

5.2 CLASSES AND CLASS DIAGRAM

Table 5.1 shows the base class and its imported classes.

Table 5.1. Importing Classes and Classes Used for Development

Java Components	Java Class
import javax.swing	JMenuBar, JMenuItem, AbstractTableModel, TableColumn, JButtons, JPanel, JSplitPane, JToolBar, ImageIcon
import com.esri.mo2.ui.bean	TocAdapter, TocEvent, Map, Layer, Toc, Legend, Tool
import com.esri.mo2.ui.tb	ZoomPanToolBar, SelectionToolBar, ProjectToolBar
import com.esri.mo2.file.shp	ShapefileWriter, ShapefileFolder
import com.esri.mo2.map.dpy	BaseFeatureLayer, Layerset, FeatureLayer

After initializing the tool, shape files and image files, the tool is launched and the above classes enable the basic GIS tool functionality.

Figure 5.2 highlights the buttons and the class invoked by the buttons. Let's discuss them in detail:

- Learn More from Internet: On selection of Learn More button the system creates object of Class learn_more (see Figure 5.2). The learn_more.java file opens a wiki page of currently selected war. The following code is used to open up web page. Runtime.getRuntime().exec("rundll32 url.dll,FileProtocolHandler " + url)
- Learn More Button: On selection of Learn More button the system creates object of Class learn (see Figure 5.3). The learn.java file opens a web page of currently selected war.
- Take Quiz: While opening the Take Quiz window, on successful entry of the password the tool creates an object of quiz_maker class (see Figure 5.4). The user

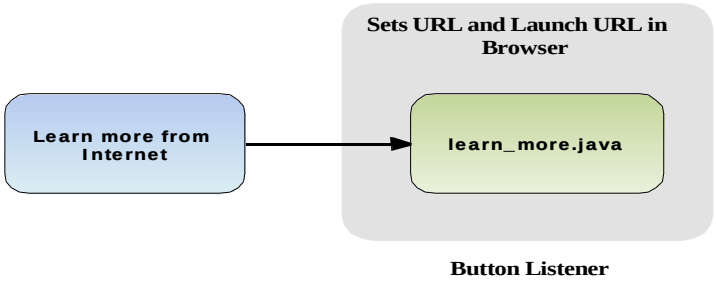

Figure 5.2. Class diagram for Learn More from Internet button.

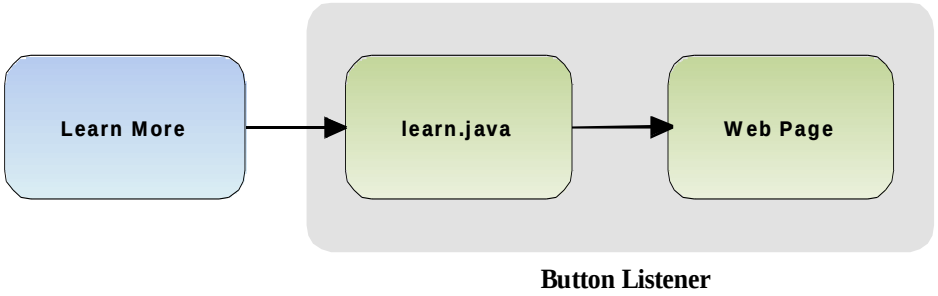

Figure 5.3. Class diagram for Learn More button.

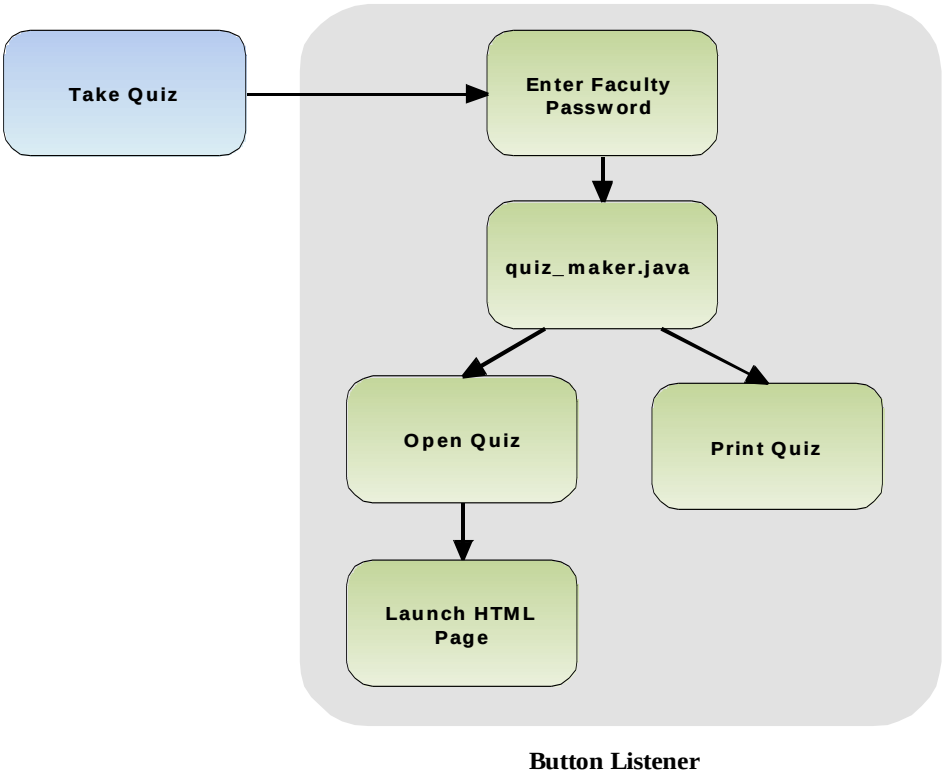

Figure 5.4. Class diagram for Take Quiz button.

selects the war for which he wants to open or print the quiz which results in all the quizzes created for that particular war are displayed in the drop-down list. Open and Print buttons are available for selection.

- Picture Game: After clicking on this button one image is randomly selected from the Images folder and is drawn on the panel of the dialog window. A window pops up with an image of one the generals involved in the war and shows four options on the screen.. If the user selects the right answer, a feedback is provided is displayed on the screen (see Figure 5.5).

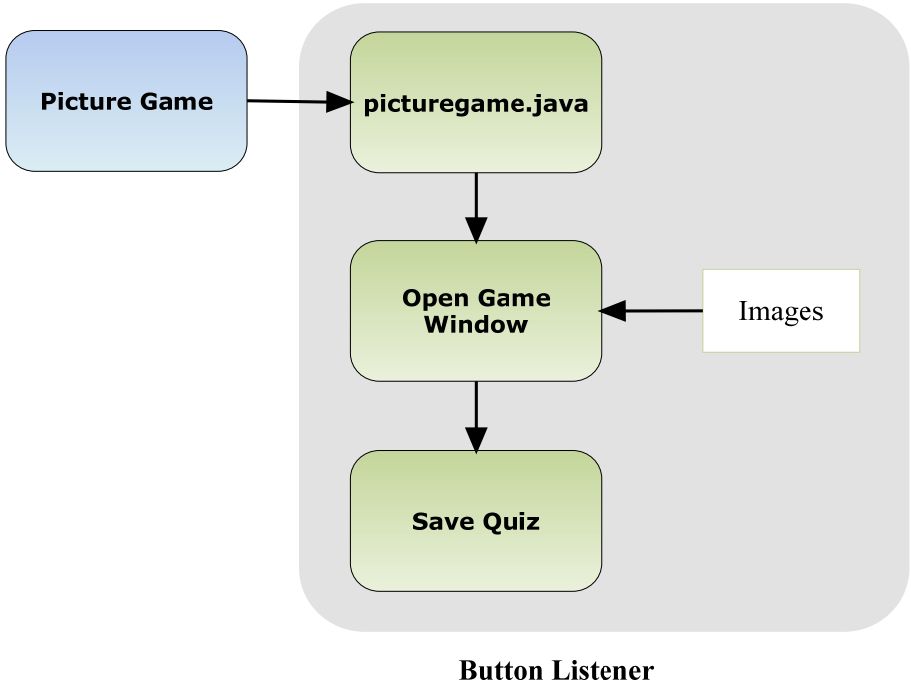

Figure 5.5. Class diagram for Picture Game button.

- Play N Learn: When this button is clicked the button listener creates an object of class PlayNLearn which implements the pickListener interface from MapObjects. When the button is clicked it also invokes a dialog box asking the user a question about the battle. The user then has to respond to the question by selecting the correct option, followed by clicking on the country where the battle was fought. If the user is right we verify the answer using the pickListener method. We also ask the user if they want to learn more about the battle. If yes then corresponding informative page is opened for that battle.
- Create Quiz: While opening the Create Quiz window, on successful entry of the password the tool opens the quiz.html page (see Figure 5.6). The user creates the quiz and then can either save the quiz or just open the quiz and print for use.

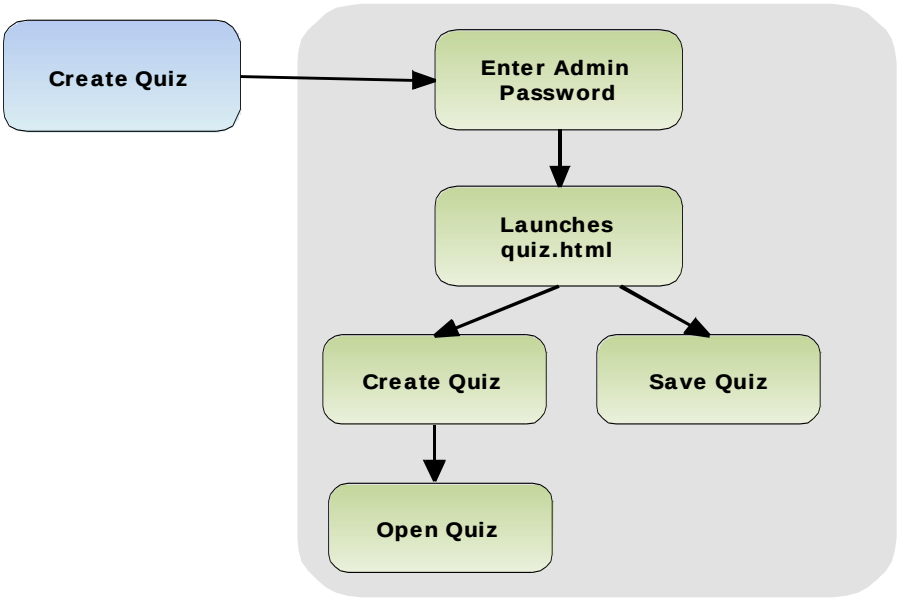

Figure 5.6. Class diagram for Create Quiz button.

CHAPTER 6

NETBEANS IDE AND MAPOBJECTS CONFIGURATION

NetBeans IDE (Integrated Development Environment) is used for the editing, compiling and development of the GIS tool as it provides an ability to integrate with the MapObjects Java Edition beans allowing a drag and drop development. The steps below explain how this was achieved.

1. Install NetBeans IDE from NetBeans website [5].
2. Install MapObjects Java Edition. Contact Dr. Carl Eckberg for the installation CD.
3. Launch NetBeans IDE from Start->Programs->NetBeans.
4. Select Tools->Libraries.
5. Figure 6.1 shows the screenshot of the window that appears after this step.

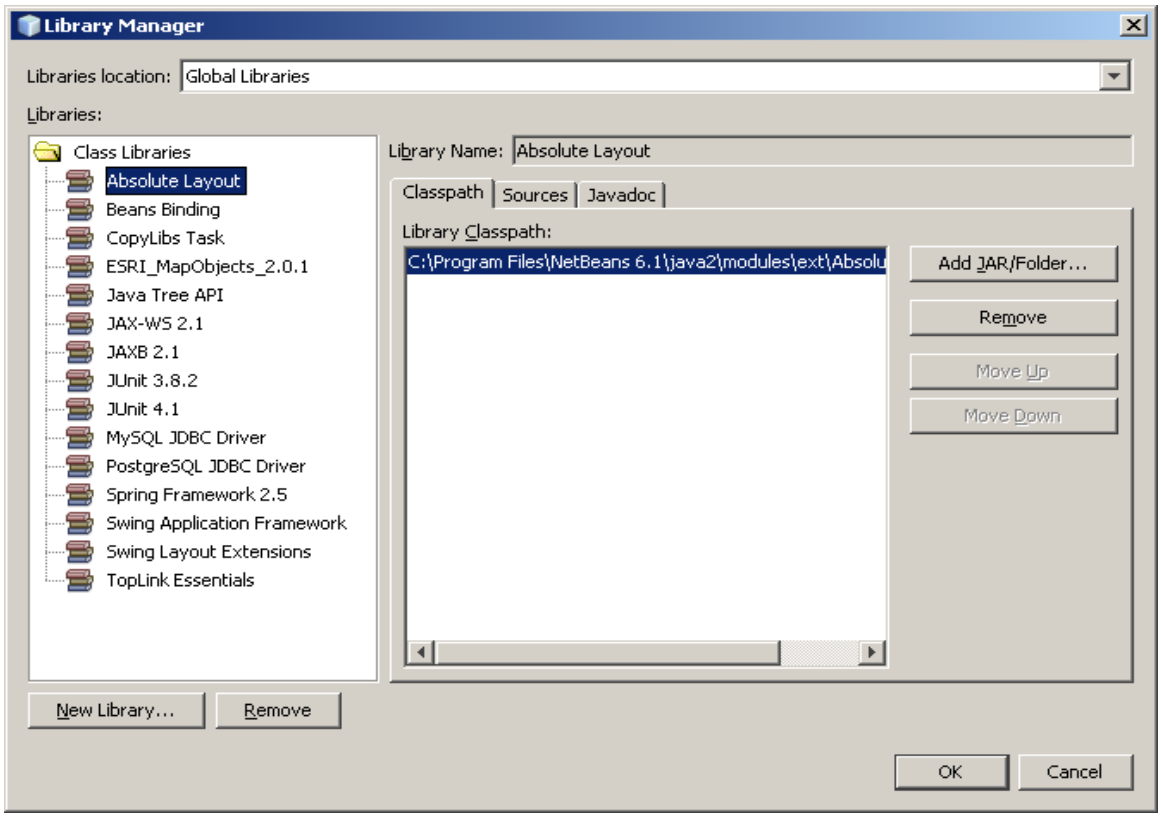

Figure 6.1. NetBeans library manager.

6. Select New Library.
7. Type in the new library name, In the sample the library has been named as ESRI_MapObjects_2.0.X.
8. Figure 6.2 shows the screenshot of the window that appears after this step.

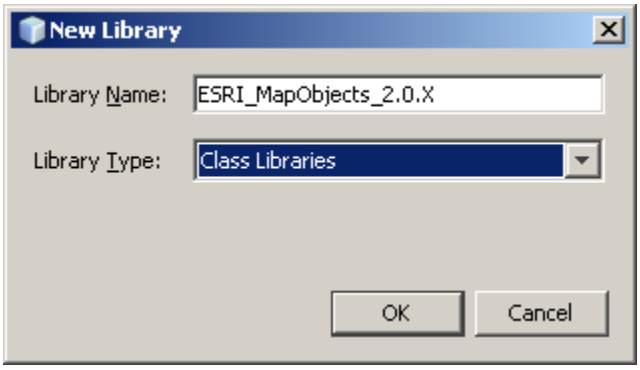

Figure 6.2. NetBeans new library.

9. With the newly created library selected on the left, select the Classpath tab and select the Add JAR/Folder.
10. Figure 6.3 shows the screenshot of the window that appears after this step.

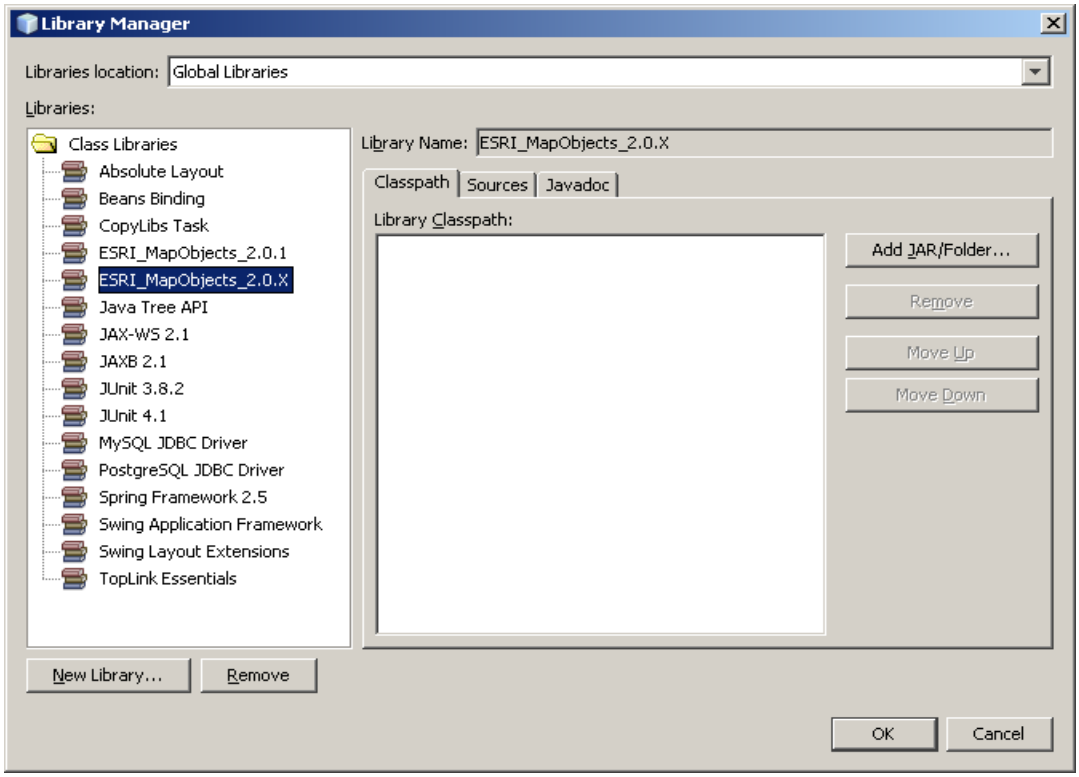

Figure 6.3. NetBeans library manager selecting class path.

11. Navigate to the folder where MapObjects was installed. In the sample the installation was at C:\ESRI\MOJ20\lib.
12. Figure 6.4 shows the screenshot of the window that appears after this step.

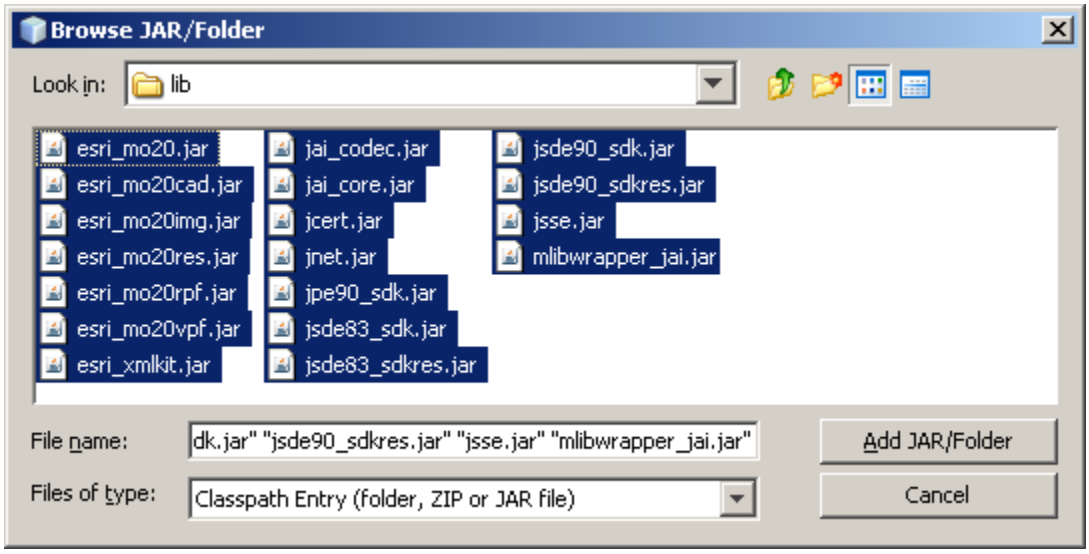

Figure 6.4. NetBeans browse JAR folder.

13. Select all the JAR files and press Add JAR/Folder.
14. Select Tools->Palette->Swing/AWT Component.
15. Figure 6.5 shows the screenshot of the window that appears after this step.

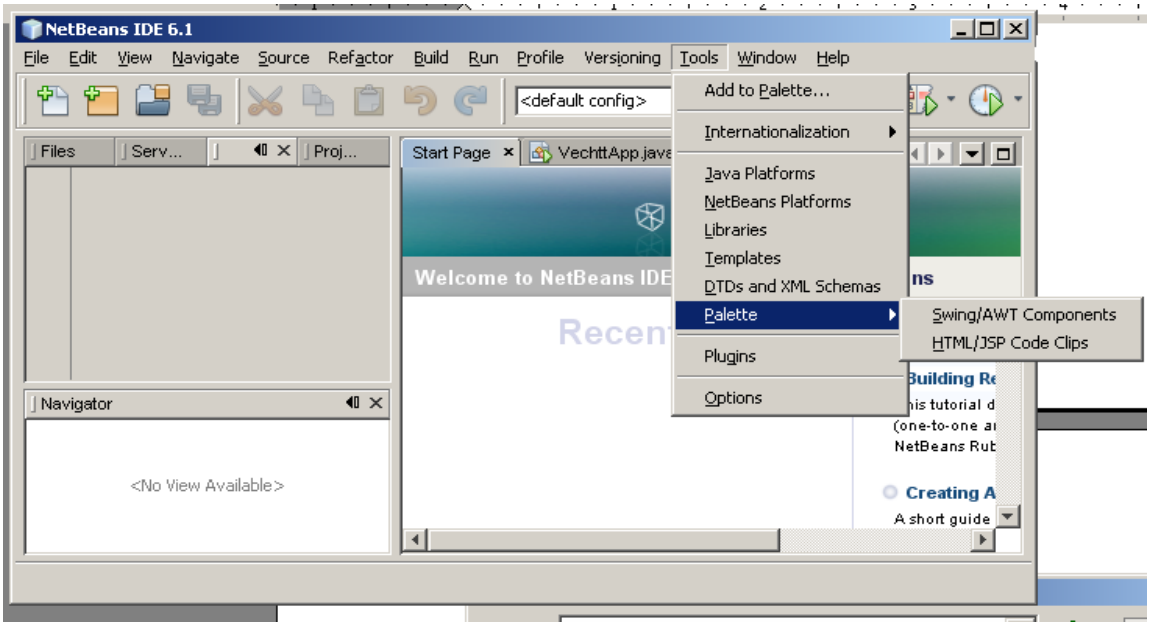

Figure 6.5. NetBeans palette menu.

16. Select Add from Library.
17. Figure 6.6 shows the screenshot of the window that appears after this step.

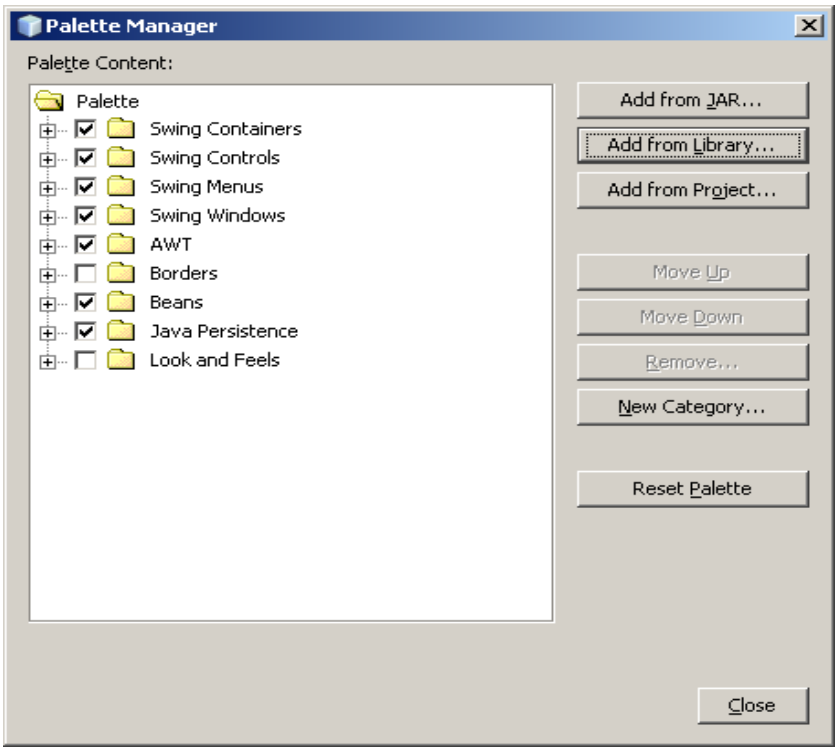

Figure 6.6. NetBeans palette manager.

18. Select the new library that was created.
19. Select Next >.
20. Figure 6.7 shows the screenshot of the window that appears after this step.
21. Select all the items.
22. Figure 6.8 shows the screenshot of the window that appears after this step.
23. Select Beans Folder.
24. Figure 6.9 shows the screenshot of the window that appears after this step.

Now all the design objects can be seen in the Palette window can be selected and dropped onto the application.

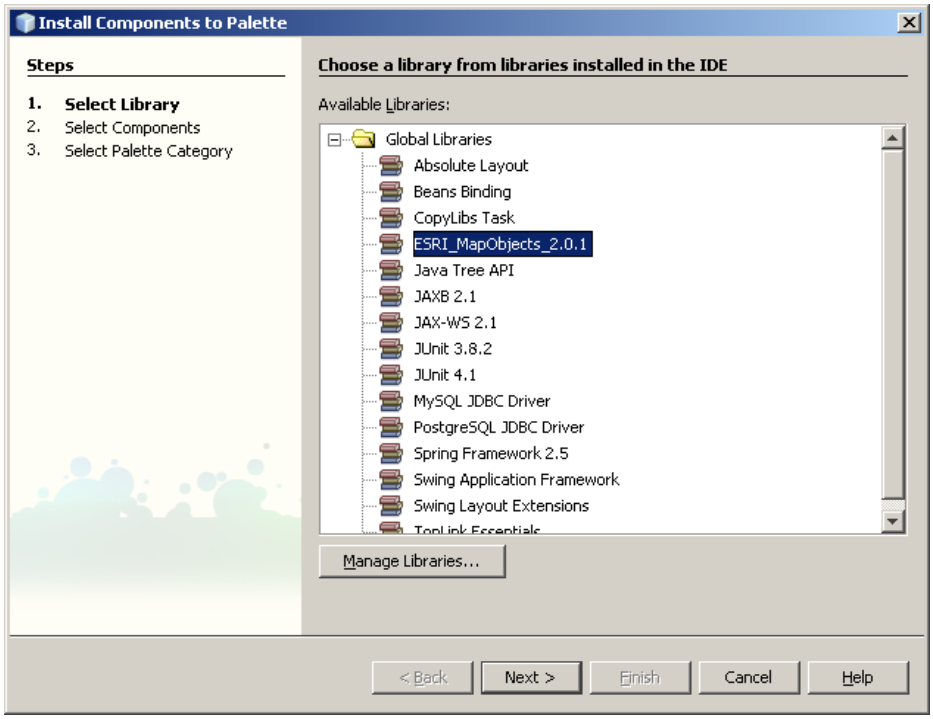

Figure 6.7. NetBeans install components to palette.

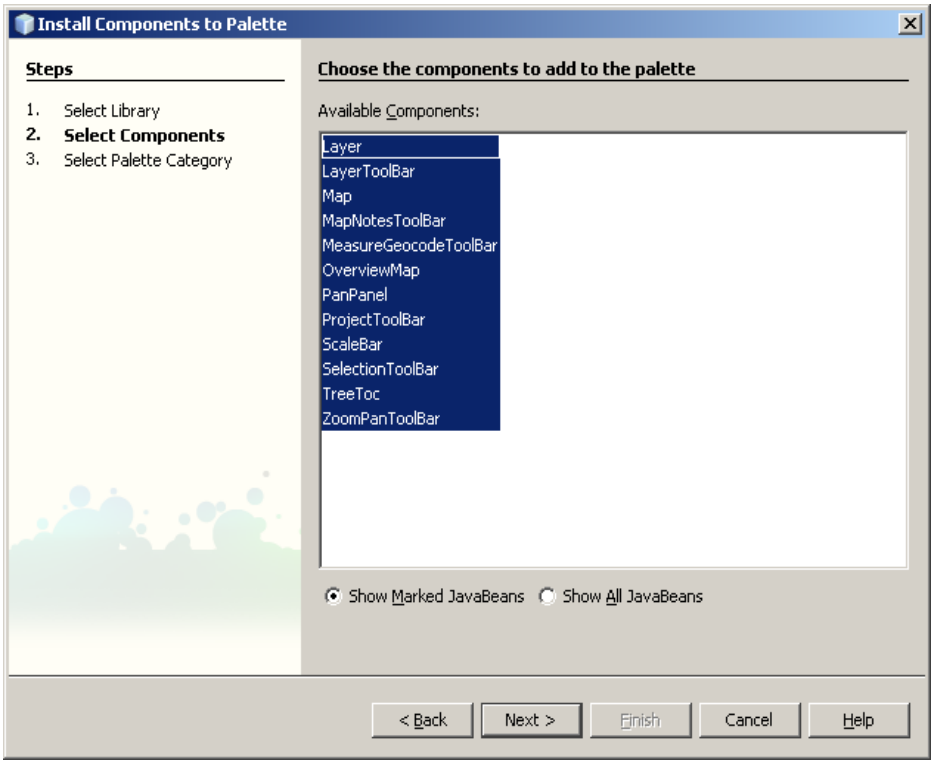

Figure 6.8. NetBeans palette component selection.

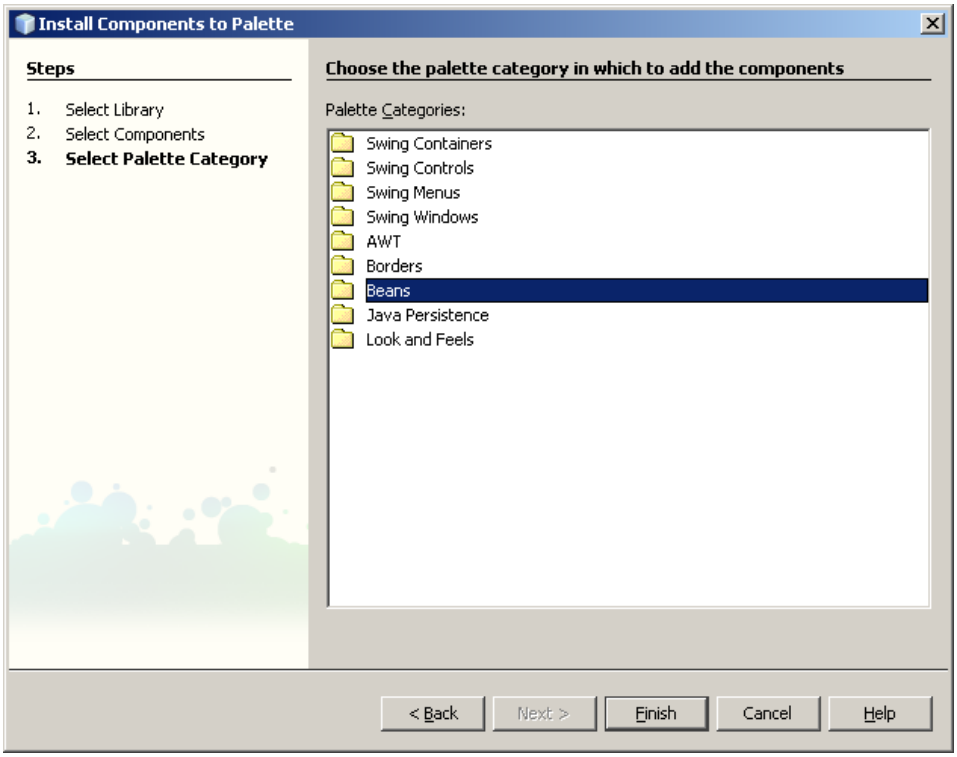

Figure 6.9. NetBeans palette category selection.

CHAPTER 7

MAPOBJECTS TOOLBARS

Many default beans are provided by MapObjects Java Edition which the user can add to the application and can be dragged and dropped onto the workspace to provide basic functionality. Beans are actually Toolbars provided by MapObjects which can provide commonly used functions such as open project, save project etc. Refer to the topics in Figure 7.1 to understand using tools of the map view.

Figure 7.1. MapObject toolbars.

7.1 COM.ESRI.MO2.UI.TB.PROJECTTOOLBAR

The ProjectToolBar allows an end-user to open, close, save a map project and print a map image to file. The following actions are supported by this Toolbar [3]:

- **OpenProject** – Use this option to open a previously created Project
- **SaveProject** – Use this option to save newly created project
- **CloseProject** – Us this option to close the project for future use
- **SaveMapImageToFile** – Use this option to save the current map to an image file
- **PrintLayer** – Use this option to print selected layer(s) in the toc.

7.2 COM.ESRI.MO2.UI.TB.SELECTIONTOOLBAR

The SelectionToolBar allows the user to perform feature selection based upon attribute or spatial queries. The following actions are supported by this Toolbar:

- **Identify** – This option provides the user with a tool for clicking on features and displaying information for the features selected on the map.

- **Find** – This option opens up a dialog for locating features whose attributes contain an end-user provided string.
- **Search** – This option opens up a dialog for locating features based on a predefined "stored query."
- **Query** – This option opens up a dialog based on a query that an end-user constructs.
- **Buffer** – This option opens a dialog for constructing a polygon around the currently selected feature.
- **Attributes** – This option displays the attributes of the layer selected on the TOC.

setMap() function must be called before using any of these actions. If you want to use *Identify*, *Query*, or *Select* Actions, then you must also call setSelectedLayer().

The setMap() function must be called before using any of these actions. The code to integrate the toolbar with the GIS tool is:

```
static com.esri.mo2.ui.bean.Map map = new com.esri.mo2.ui.bean.Map();
ProjectToolBar ptb = new ProjectToolBar();
ptb.setMap(map);
getContentPane().add(ptb, BorderLayout.NORTH);
```

7.3 COM.ESRI.MO2.UI.TB.ZOOMPANTOOLBAR

The ZoomPanToolbar allows an end-user to change the map visual look in a variety of ways. The following actions are supported by the Toolbar:

- **Zoom In** – This option provides the user tool for clicking or dragging with a rectangle on the map in order to zoom In to the map. This can be by selecting the tool OR clicking on the area you want to Zoom In.
- **Zoom Out** – This option provides the user tool for clicking or dragging with a rectangle on the map in order to zoom out from the map. This can be by selecting the tool OR clicking on the area you want to Zoom Out.
- **ZoomToSelected** – This option zooms the back depending on the selected layer on the TOC.
- **ZoomToFullExtent** – This option brings back the map to default view
- **GoPrevious** - Zooms the map to the previous possible extent in the recent history
- **GoNext** – Zooms the map to the next possible extent in the recent history
- **Pan** – The Pan option allows the user to drag the map to have better visibility in case the map is in zoomed mode.
- **PanOneDirection** – Allows the user to pan in 1 of the 4 directions allowed : East, West, North and South.

- **Identify** – Performs an Identify on the specified selected layers.

Before using any of these actions the user must not forget to call the setMap() function.

CHAPTER 8

CUSTOM TOOLBAR

Along with default toolbars provided by MapObjects Java Edition, few custom toolbars were created to enhance the usability and user experience of the GIS tool (see Table 8.1). The custom toolbar added to the map is similar to the image shown in Figure 8.1.

Table 8.1. Legend of Custom Toolbars.

Number	Tool Name	Class or Function Name
1	Print	com.esri.mo2.ui.bean.Print
2	Add Layer	com.esri.mo2.ui.tb.LayerToolBar
3	Delete Layer	com.esri.mo2.map.dpy.Layer
4	Pointer	Arrow.java
5	Draw Point	SimpleMarkerSymbol();
6	External Link	Hyperlink.java
7	Hot Link	Hotlink.java
8	Theme Attr Table	Theme_Attr_Table.java
9	Logout	Login.java
10	Add User	Admin_page.java
11	Delete User	Delete_user.java
12	Help	Help.java

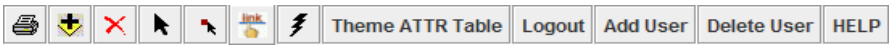

Figure 8.1. Custom toolbars.

8.1 PRINT

The print tool gives user the option to be able to print the map. The tool would be important to be able to print the map as well as the attribute table if necessary (see Figure 8.2). Below code explains how this functionality was implemented in the application.

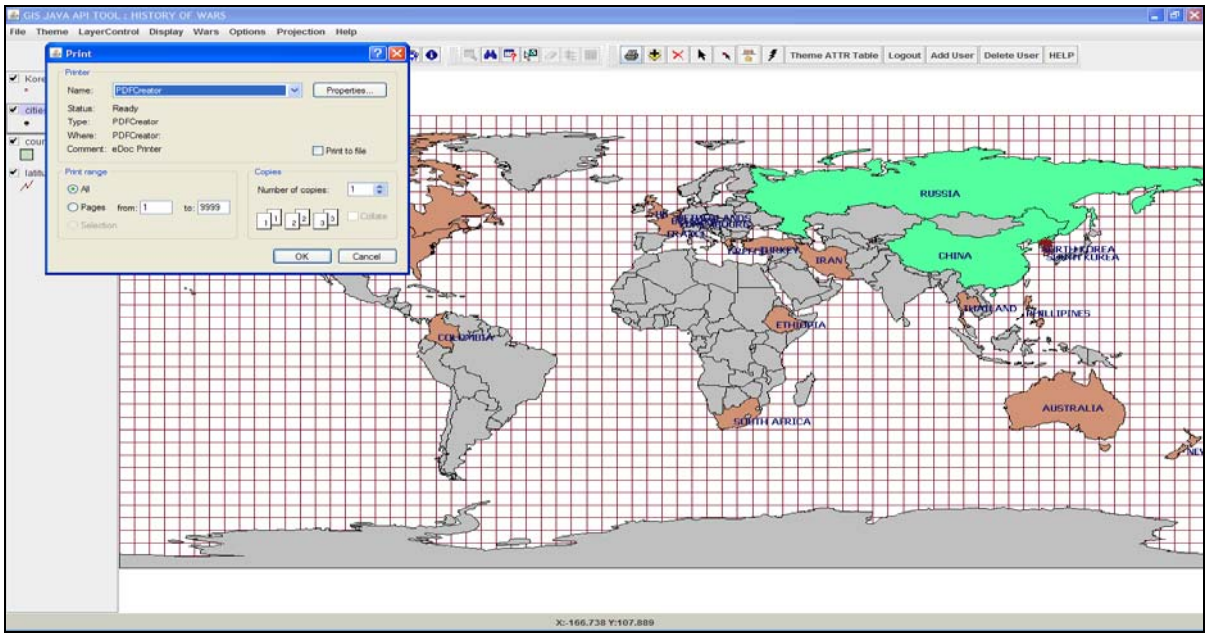

Figure 8.2. Print dialog.

```
ActionListener lis = new ActionListener() {
        public void actionPerformed(ActionEvent ae) {
        Object source= ae.getSource();
        if(src == print_button)
        {
            com.esri.mo2.ui.bean.Print mapPrint = new
            com.esri.mo2.ui.bean.Print();
                    mapPrint.setMap(map);
                    mapPrint.doPrint();
        }
```

8.2 ADD LAYER

The Add Layer tool gives user the option to be able to add layers in the table of content. The GIS tool provides an option to add a layer on the tool bar as well as in the menu options.

The setMap() function must be called before adding the toolbar option on the map. Below code [3] explains how this functionality was implemented in the application.

```
static com.esri.mo2.ui.bean.Map map = new com.esri.mo2.ui.bean.Map();

    AddLyrDialog aldlg = new AddLyrDialog();
    aldlg.setMap(map);
    aldlg.setVisible(true);getContentPane().add(addlg BorderLayout.NORTH);
```

Figure 8.3 depicts how the layer can be added. Click the plus symbol on the tool bar to add the layer; it will open windows browser. We can browse to the specific location to add the layer.

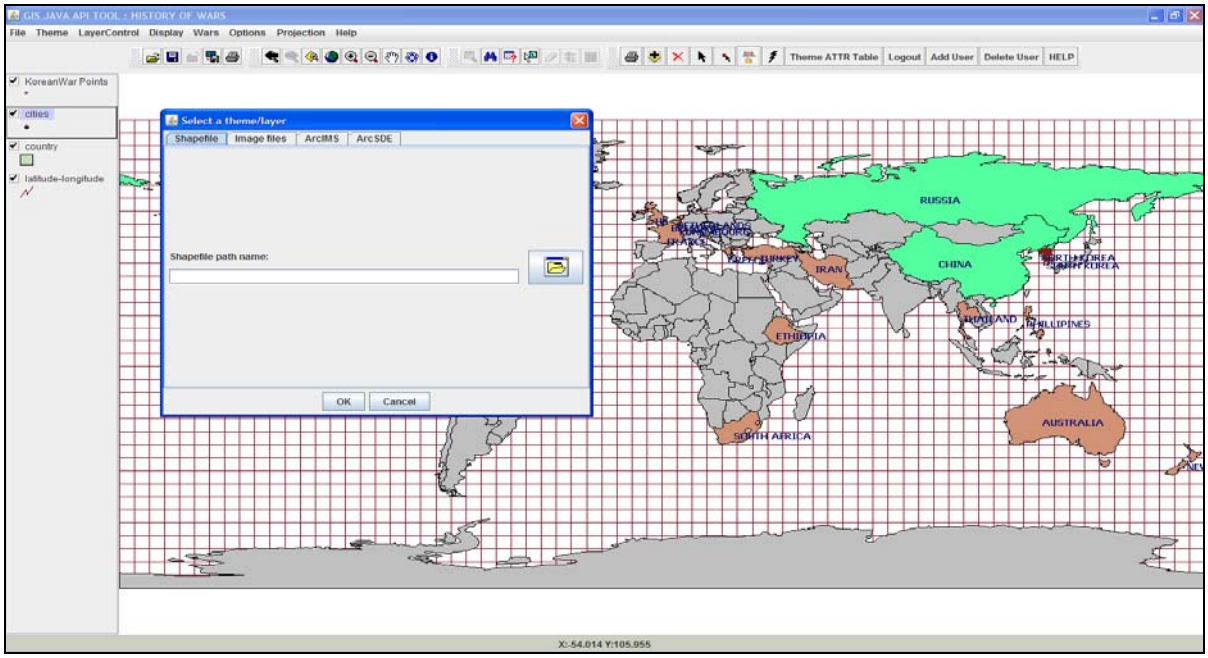

Figure 8.3. Add layer dialog window.

8.3 DELETE LAYER

The Delete Layer tool gives user the option to be able to delete layers from the TOC. The GIS tool provides an option to delete a layer from toolbar as well as in the menu options.

The setMap() function must be called before adding the toolbar option on the map. For deleting a layer click on that layer and the X symbol on the tool bar. Below code explains how this functionality was implemented in the application.

```
com.esri.mo2.map.dpy.Layer dpylayer = legend.getLayer();
map.getLayerset().removeLayer(dpylayer);
```

8.4 ARROW

The Arrow Tool is provided to the user so that they can go back to a state where no tool is selected. The Arrow class has been created to achieve this functionality. Below code explains how this functionality was implemented in the application by creating the object of arrow class and passing it to the selectedTool class when the button is pressed.

```
Arrow arrow = new Arrow(); \\ creating the object of Arrow class
button_lis = new ActionListener() {
public void actionPerformed(ActionEvent ae) {
else if (src == arrow_button) {
                        setCursor(java.awt.Cursor.DEFAULT_CURSOR);
                        map.setSelectedTool(arrow); \\ setting the map tool to arrow
                }
}
```

Code to create the Arrow class:

```
import com.esri.mo2.ui.bean.Tool;
import java.awt.event.MouseEvent;
public class Arrow extends Tool {
public void mouseClicked(MouseEvent me){
        }
}
```

8.5 HYPERLINK

As per primary requirements for the GIS tool the user should have a way to link the data available on the Internet with the data on the tool. This tool opens a wiki page for the current selected war. Below code explains how this functionality was implemented in the application.

```
if(FileName.equals("Coldwar_points.csv"))
{
        String file="http://en.wikipedia.org/wiki/Cold_War";
        Try
        {
            Runtime.getRuntime().exec("rundll32 url.dll,FileProtocolHandler "
            +file);
        }
        catch(Exception e){ catchException();}
}
```

8.6 HOT LINK

The Hotlink tool is used to display information about the battle site selected for the current war. The user clicks on one of the layers and clicks the hotlink button (see Figure 8.4); then it clicks the battle site denoted by "star" symbol. A popup window opens up giving detailed information about the battle site selected. The popup window is shown in Figure 8.5. Below code was used to achieve this functionality.

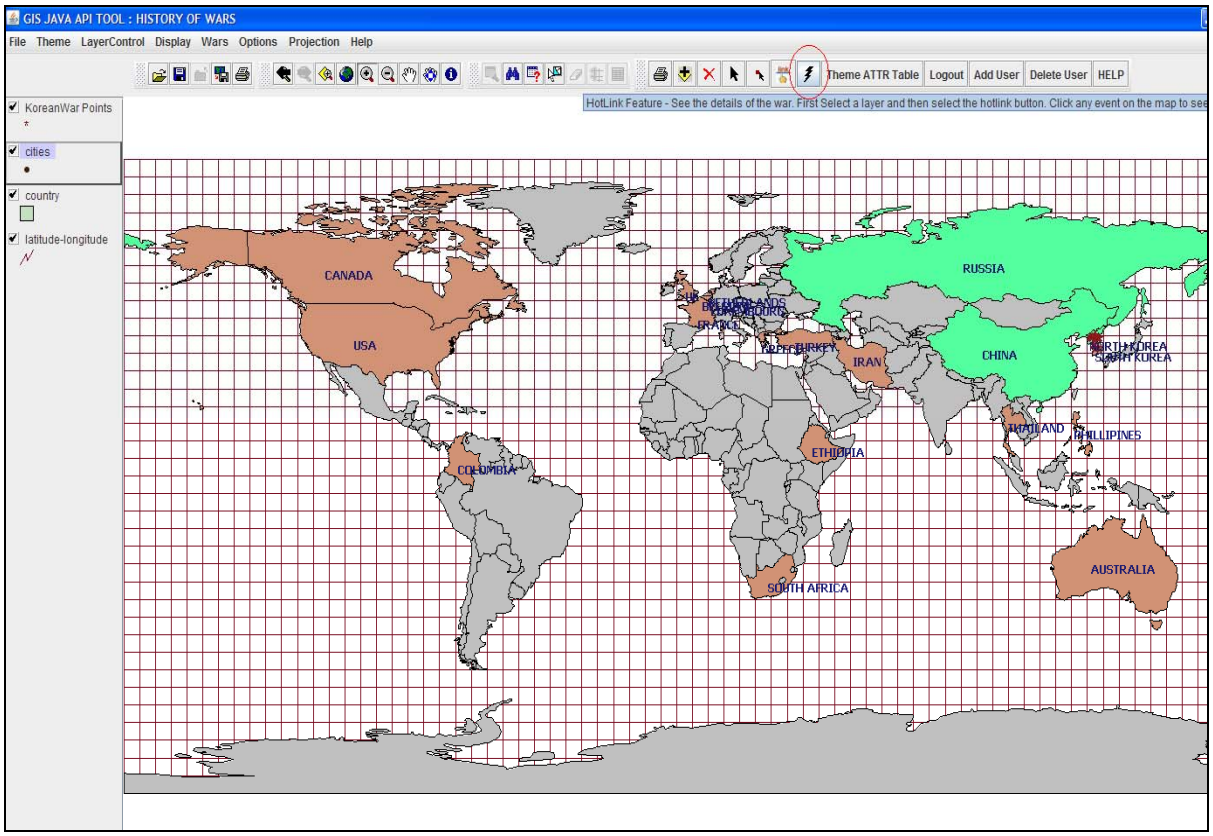

Figure 8.4. Hotlink button.

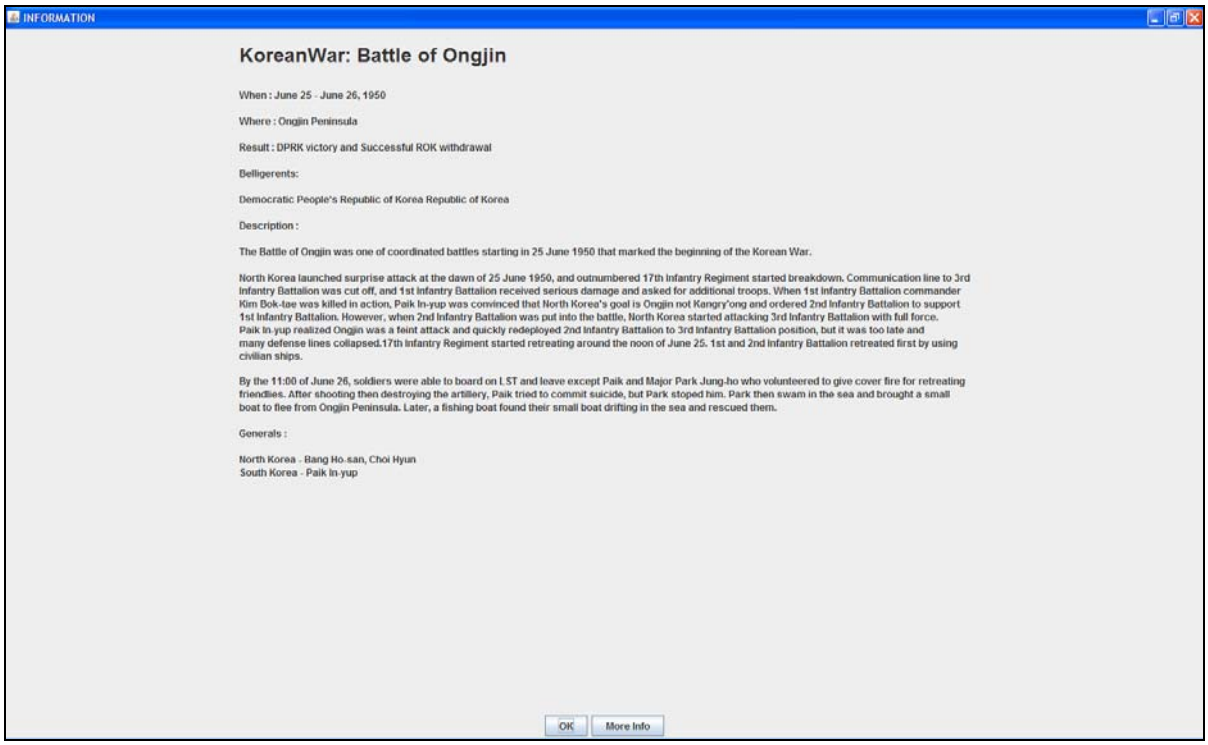
INFORMATION
KoreanWar: Battle of Ongjin
When : June 25 - June 26, 1950
Where : Ongjin Peninsula
Result : DPRK victory and Successful ROK withdrawal
Belligerents:
Democratic People's Republic of Korea Republic of Korea
Description :
The Battle of Ongjin was one of coordinated battles starting in 25 June 1950 that marked the beginning of the Korean War.
North Korea launched surprise attack at the dawn of 25 June 1950, and outnumbered 17th Infantry Regiment started breakdown. Communication line to 3rd Infantry Battalion was cut off, and 1st Infantry Battalion received serious damage and asked for additional troops. When 1st Infantry Battalion commander Kim Bok-tae was killed in action, Paik In-yup was convinced that North Korea's goal is Ongjin not Kangry'ong and ordered 2nd Infantry Battalion to support 1st Infantry Battalion. However, when 2nd Infantry Battalion was put into the battle, North Korea started attacking 3rd Infantry Battalion with full force. Paik In-yup realized Ongjin was a feint attack and quickly redeployed 2nd Infantry Battalion to 3rd Infantry Battalion position, but it was too late and many defense lines collapsed.17th Infantry Regiment started retreating around the noon of June 25. 1st and 2nd Infantry Battalion retreated first by using civilian ships.
By the 11:00 of June 26, soldiers were able to board on LST and leave except Paik and Major Park Jung-ho who volunteered to give cover fire for retreating friendlies. After shooting then destroying the artillery, Paik tried to commit suicide, but Park stoped him. Park then swam in the sea and brought a small boat to flee from Ongjin Peninsula. Later, a fishing boat found their small boat drifting in the sea and rescued them.
Generals :
North Korea - Bang Ho-san, Choi Hyun
South Korea - Paik In-yup
OK
More Info

Figure 8.5. Popup window.

```
public void lighteningBolt(com.esri.mo2.cs.geom.Point worldPoint)
{
        Double xOriginal = null,yOriginal = null;
        String imageName="",imageUrl="";
        double xMouse = Double.parseDouble(df.format(worldPoint.getX()));
        double yMouse = Double.parseDouble(df.format(worldPoint.getY()));
        try
        {
        System.out.println("Inside Try");
        FileReader fred1 = new FileReader("C:\\GIS Java Multimedia
        Tool\\ESRI\\" +
        FileName);//Coldwar_points.csv");//file);
        BufferedReader in = new BufferedReader(fred1);
        String s; // = in.readLine();
        while ((s = in.readLine()) != null)
        {
            StringTokenizer st = new StringTokenizer(s,",");
            xOriginal = Double.parseDouble(st.nextToken());
            yOriginal = Double.parseDouble(st.nextToken());
            if( xOriginal - 1.0 < xMouse && xMouse < xOriginal + 1.0 &&
            yOriginal - 1.0 < yMouse && yMouse < yOriginal + 1.0)
            {
                    System.out.println("Selected: /n");
                    imageName=st.nextToken();
                    imageUrl=st.nextToken();
                    flag2=true;
                    //System.out.println(imageName);
                    //System.out.println(imageUrl);
                    break;
            }
        }
        fred1.close();
        }
        catch(Exception e)
        {
            System.out.println("Exception" + e);
            //catchException();
        }
        if(flag2==true)
        {
        MessageBox tp=new MessageBox(imageUrl,imageName,FileName);
        tp.setSize(1280, 765);
        tp.show();
        flag2=false;
        }
}
```

8.7 THEME ATTR TABLE

Theme Attr Table is used to open the attribute table for the layer selected from TOC (see Figure 8.6). The user selects a layer from the left hand panel and clicks the Theme Attr Table button to open a window the attribute table for that layer.

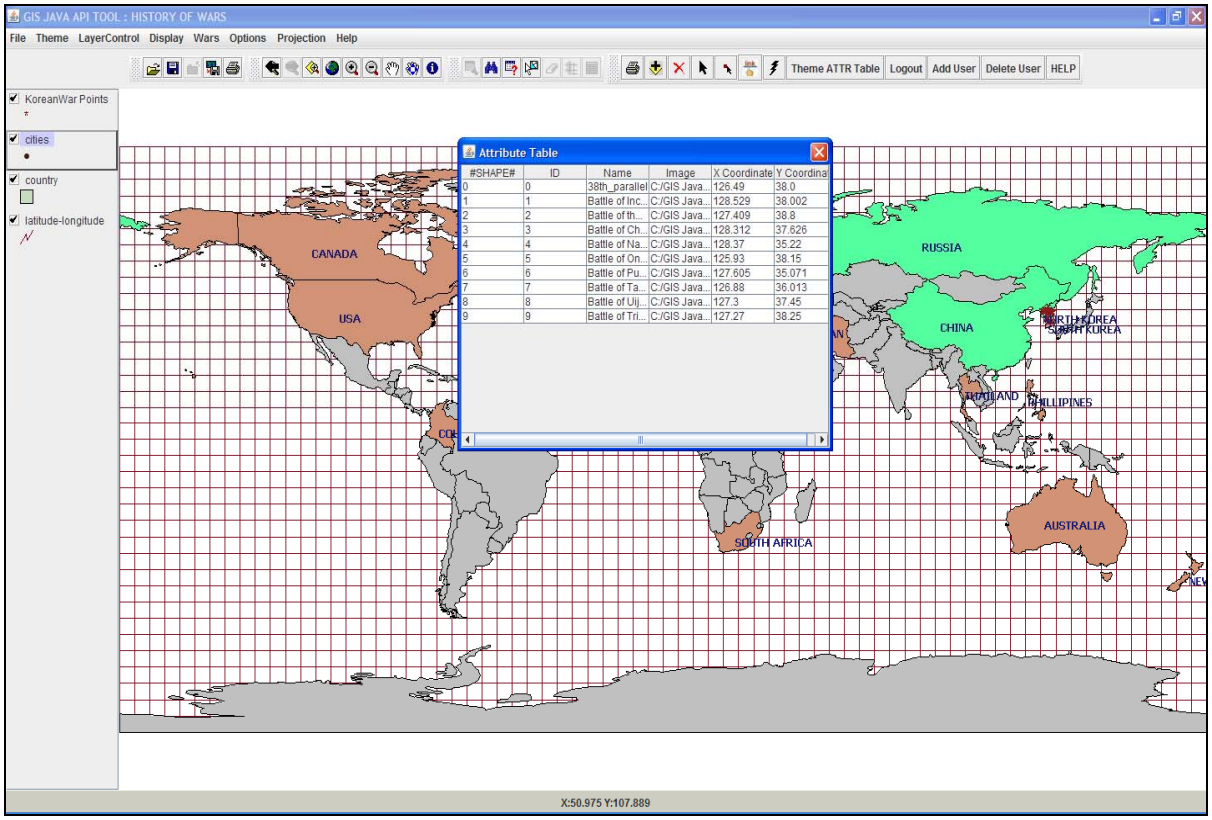
GIS JAVA API TOOL : HISTORY OF WARS
File Theme LayerControl Display Wars Options Projection Help
Theme ATTR Table
Logout
Add User
Delete User
HELP
KoreanWar Points
cities
country
latitude-longitude
Attribute Table
#SHAPE# ID Name Image X Coordinate Y Coordinat
0 0 38th_parallel C:/GIS Java... 126.49 38.0
1 1 Battle of Inc... C:/GIS Java... 128.529 38.002
2 2 Battle of In... C:/GIS Java... 127.409 38.8
3 3 Battle of Ch... C:/GIS Java... 128.312 37.626
4 4 Battle of Na... C:/GIS Java... 128.37 35.22
5 5 Battle of On... C:/GIS Java... 125.93 38.15
6 6 Battle of Pu... C:/GIS Java... 127.605 35.071
7 7 Battle of Ta... C:/GIS Java... 126.88 36.013
8 8 Battle of Uij... C:/GIS Java... 127.3 37.45
9 9 Battle of Tri... C:/GIS Java... 127.27 38.25
CANADA
USA
RUSSIA
CHINA
PHILLIPINES
AUSTRALIA
SOUTH AFRICA
X:50.975 Y:107.889

Figure 8.6. Theme Attr Table.

8.8 LOGOUT

Logout option is used to log the user out of the system (see Figure 8.7). The user is navigated to the login screen on clicking the logout button. The user can exit from the system or login as a student or Admin.

8.9 ADD USER

The system allows only Admin to Add Users. Clicking on the Add User button on the Default map view opens the add user screen (see Figure 8.8). Admin enters the username, password, confirm password fields (Note: Password and Confirm password should match) and clicks on the Add button. To cancel adding the user to the system click cancel.

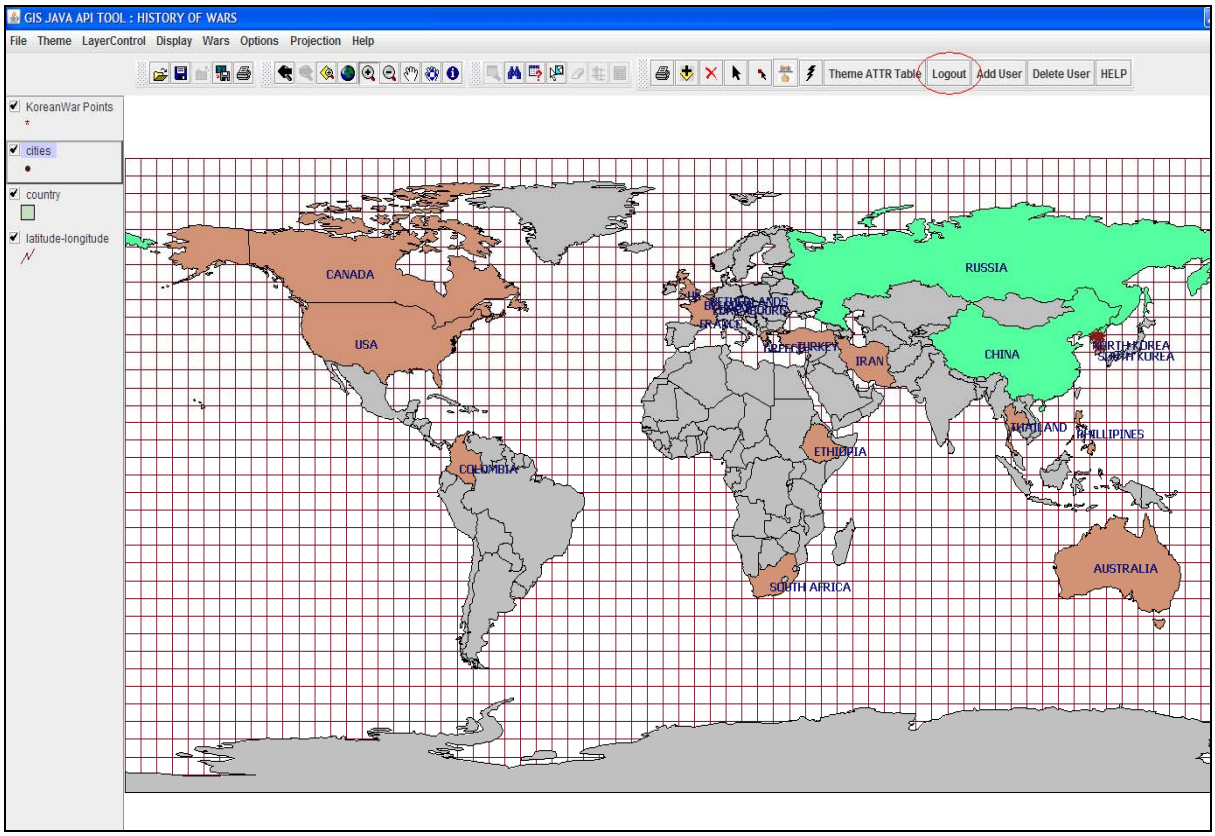

Figure 8.7. Logout.

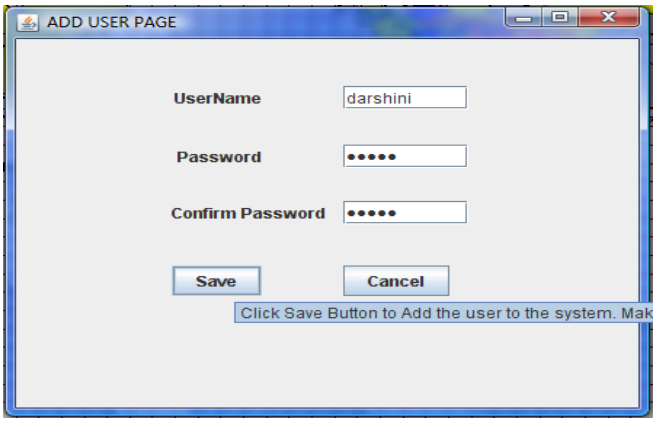

Figure 8.8. Add user.

8.10 DELETE USER

The system allows only Admin to Delete Users. When the user selects the delete button on the base map window a new delete user window is displayed (see Figure 8.9). Enter username and password of the user to be deleted. System asks for a confirmation of deleting the user. Click cancel button to not allow deletion of user.

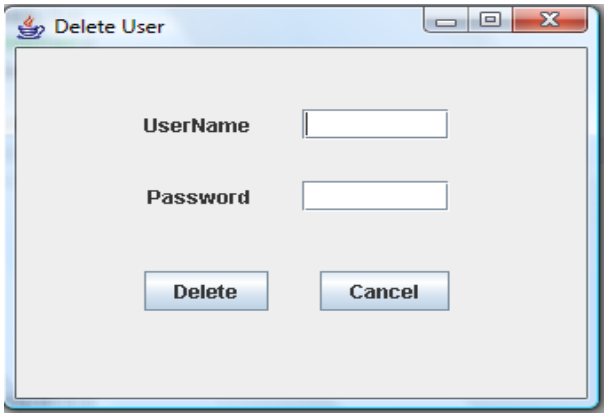

Figure 8.9. Delete user.

8.11 HELP BUTTON

This option helps the user to open "help" if they require knowing the functionality of any of the customized toolbar buttons. The user clicks the "Help" button and clicks on any customized toolbar buttons for which help is required (see Figure 8.10). The system displays a pop-up window describing the functionality of the tool-bar button.

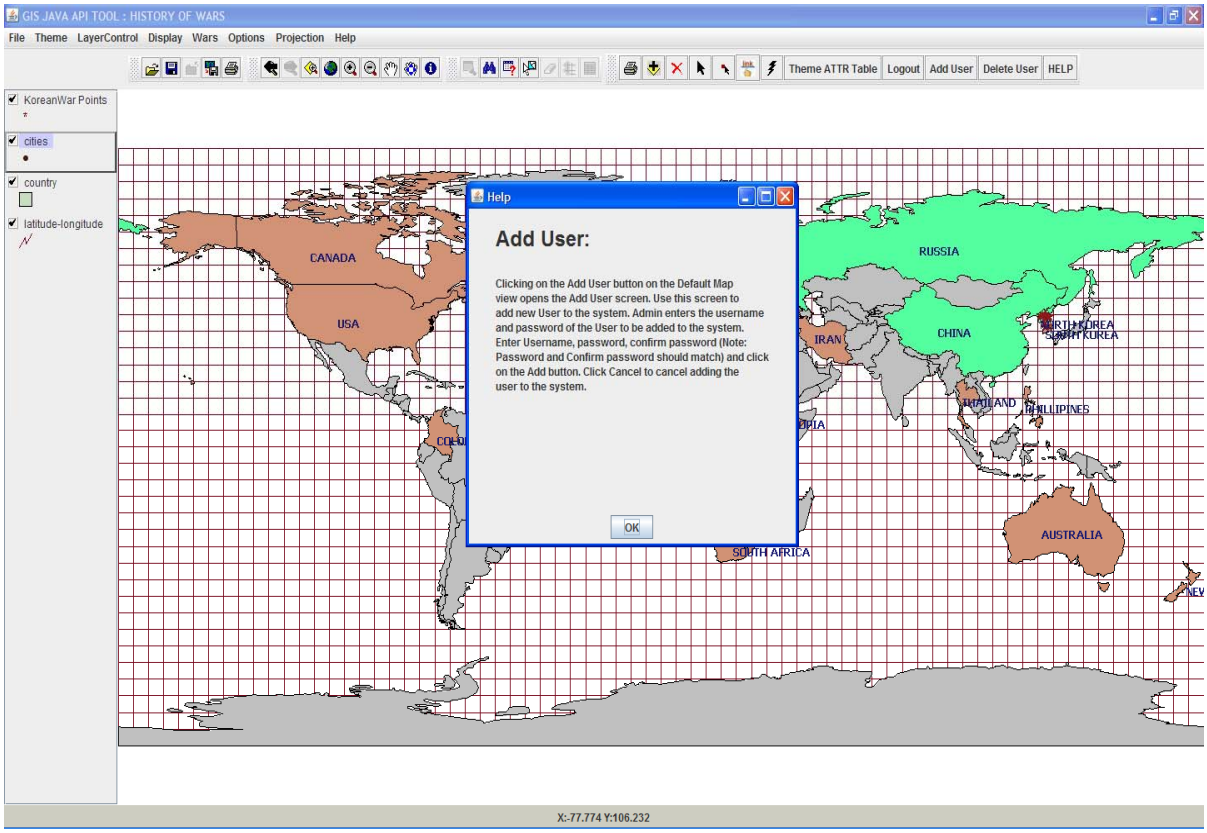
GIS JAVA API TOOL : HISTORY OF WARS
File Theme LayerControl Display Wars Options Projection Help
Theme ATTR Table Logout Add User Delete User HELP
KoreanWar Points
cities
country
latitude-longitude
Help
Add User:
Clicking on the Add User button on the Default Map view opens the Add User screen. Use this screen to add new User to the system. Admin enters the username and password of the User to be added to the system. Enter Username, password, confirm password (Note: Password and Confirm password should match) and click on the Add button. Click Cancel to cancel adding the user to the system.
OK
CANADA
USA
RUSSIA
CHINA
IRAN
AUSTRALIA
SOUTH AFRICA
X:-77.774 Y:106.232

Figure 8.10. Help button.

CHAPTER 9

PROJECT LAYER

A small portion of geographic data in some area is referred to layer in GIS. A layer is same as legend on paper map. The feature layers that are shown in the tool are implemented using com.esri.mo2.map.dpy.BaseFeatureLayer class and com.esri.mo2.ui.bean.Layer class.

9.1 COM.ESRI.MO2.UI.BEAN.LAYER

Layer Properties an important tool in the GIS Toolkit, implements a user interface which allows users to change the properties of a layer such as its renderer and symbology. One of the major challenges faced during the development of the GIS tool was that after the user had modified the layer properties, the map would get refreshed and show whatever the user had changed but the table of contents was never refreshed. lp.setToc () function was not usable since tree TOC was used rather than default TOC. Code below was written to overcome this problem.

The action of tool launch is tied to the action of selecting a layer from the table of contents and then double clicking on the table of the contents for the GIS Multimedia Tool. com.esri.mo2.ui.ren.LayerProperties class has been used to implement layer properties tool. This has been implemented via the following code.

```
lp.addWindowListener(new java.awt.event.WindowAdapter() {
        @Override
        public void windowDeactivated(java.awt.event.WindowEvent evt) {
            treeToc1.refresh();
        }
});
```

After the execution of the above code the table of contents will be refreshed.

9.2 CONVERTING CSV OR TEXT FILE TO SHAPE FILE

We can convert a CSV file to shape by the code shown below. The CSV file (see Figure 9.1) below is an example of creating CSV data to plot points on the map for a particular war.

MexicanWar.csv - Notepad
File Edit Format View Help
-97.79,24.38,Battle of Palo Alto,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Battle of Palo Alto.txt
-117.5,34.2,Battle of Buena Vista,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Buena Vista.txt
-116.25,32.18,Battle of Cerro Gordo,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Cerro Gordo.txt
-77.03,38.9,Battle of Chapultepec,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Battle of Palo Alto.txt
-99.9,19.1,Battle of Churubusco,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Churubusco.txt
-97.6,19.9,Battle of Contreas,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/Contreas.txt
-99.5,21.59,EL MOLINO DEL REY,C:/GIS Java Multimedia Tool/Thesis/Mexican War/Mexican War - Main Events/EL MOLINO DEL REY.txt

Figure 9.1. Sample of MexicanWar.csv file

```
JFileChooser jfc = new JFileChooser();
BasePointsArray bpa = new BasePointsArray();
FeatureLayer XYlayer;

File file = jfc.getSelectedFile();
FileReader fred = new FileReader("c:\\GIS Java Multimedia Tool\\ESRI\\" +
FileName);//Coldwar_points.csv");
BufferedReader in = new BufferedReader(fred);
String s; // = in.readLine();
double x,y;
int n = 0;
String str;
while ((s = in.readLine()) != null) {
        StringTokenizer st = new StringTokenizer(s,",");
        str = st.nextToken();
        x = Double.parseDouble(str);
        xCoordinate.addElement(x+"");
        str = st.nextToken();
        y = Double.parseDouble(str);
        yCoordinate.addElement(y+"");
        bpa.insertPoint(n++,new com.esri.mo2.cs.geom.Point(x,y));
        str = st.nextToken();
        s2.addElement (str);
        str = st.nextToken();
        s5.addElement (str);
```

```
XYfeatureLayer xyfl = new
XYfeatureLayer(bpa,map,s2,s5,xCoordinate,yCoordinate,FileName);
        XYlayer = xyfl;
        xyfl.setVisible(true);
        map = ColdWar.map;
        map.getLayerset().addLayer(xyfl);
        map.redraw(); }

class XYfeatureLayer extends BaseFeatureLayer {
        BaseFields fields;
        private java.util.Vector featureVector;
        public XYfeatureLayer(BasePointsArray bpa,Map map,Vector s2, Vector
        s5,Vector xCoordinate,Vector yCoordinate,String FileName)
        {
            BaseFeatureClass bfc = getFeatureClass(f + " Terms",bpa);
            setFeatureClass(bfc);
            BaseSimpleRenderer srd = new BaseSimpleRenderer();
            setRenderer(srd);
        }
```

CHAPTER 10

ADDITIONAL TOOLS

GIS java multimedia tool provides other features in addition to the default GIS toolbars. These tools enhance the functionality and usability for the user. The following tools will be discussed in this section.

10.1 POP-UP WINDOW

To use the pop-up functionality the user clicks the battle site with "*" symbol. A pop-up window appears with war information and battle fought along with the Summary button. In order to view the information about a particular battle click on the battle site. (see Figure 10.1). The user clicks on the summary button to open a window giving detailed description of the battle.

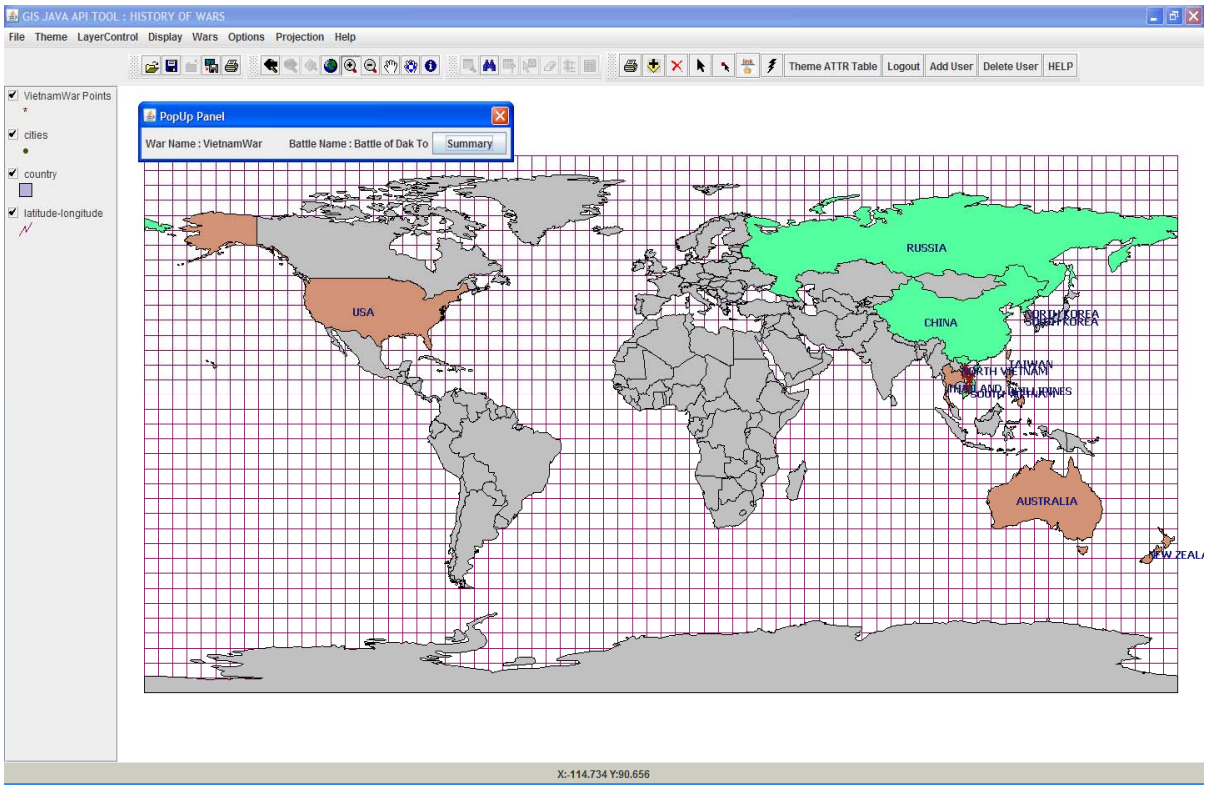

Figure 10.1. Pop-up window.

10.2 IMAGE ZOOM

The major reason for providing this functionality was to enhance the user experience for the tool by providing navigation and zooming capabilities. The images displayed for each war in the web page are displayed as thumbnails by default. To view larger view of the image the user needs to click on the image (see Figure 10.2). This functionality is to provide the user with the option of zooming in to the image and navigating in the zoom view whenever required. This will open a slideshow view of all the images on the web page. The user can navigate through all the images or click on the slideshow to go back to normal view.

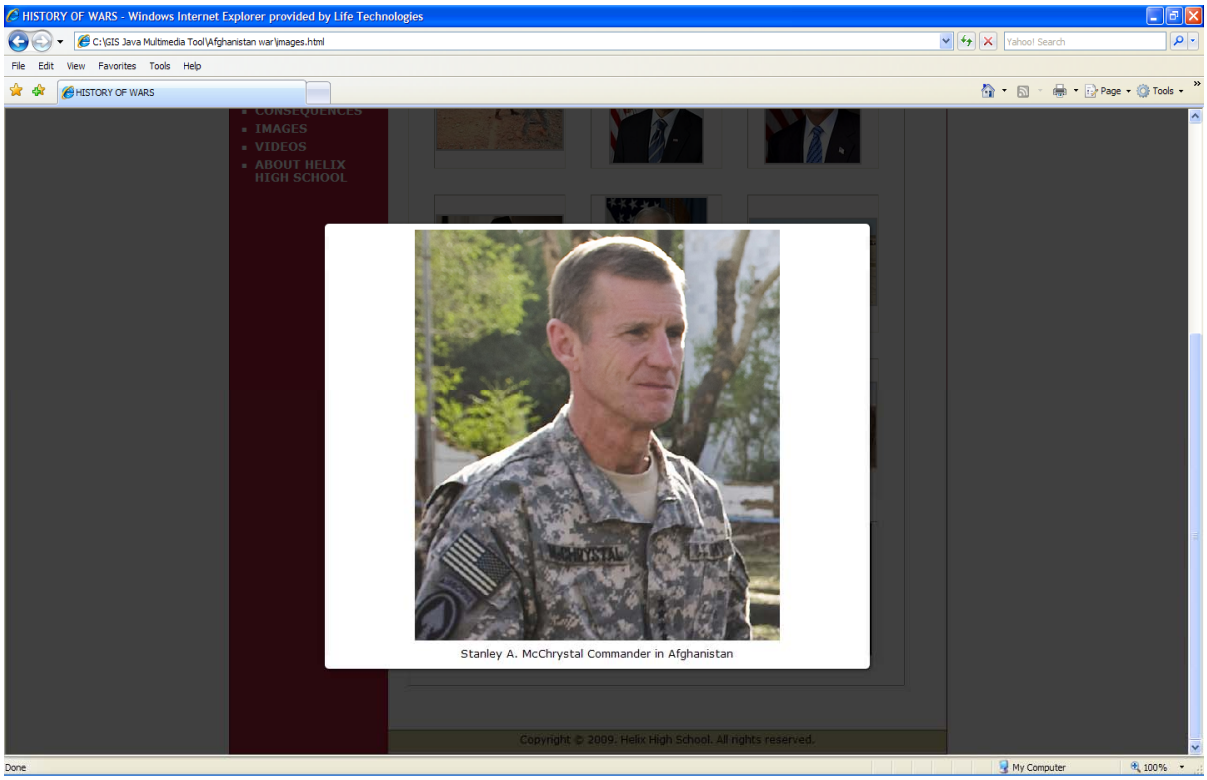
HISTORY OF WARS - Windows Internet Explorer provided by Life Technologies
C:\GIS Java Multimedia Tool\Afghanistan war\images.html
File Edit View Favorites Tools Help
HISTORY OF WARS
IMAGES
VIDEOS
ABOUT HELIX HIGH SCHOOL
Stanley A. McChrystal Commander in Afghanistan
Copyright © 2009. Helix High School. All rights reserved.
Done
My Computer
100%

Figure 10.2. Image zoom.

10.3 CO-ORDINATES DISPLAY

Showing the co-ordinates on the map depending on the current mouse location was one of the major requirements for the thesis. If the student was looking at a war and knew that location of a battle site was 102.84, 29.445 the user could use this tool display as help. This tool can also be used for draw point option on the map as discussed below. The co-ordinates are shown on a panel (see Figure 10.3). The implementation for this feature has been taken from Dr. Carl Eckberg's notes [5].

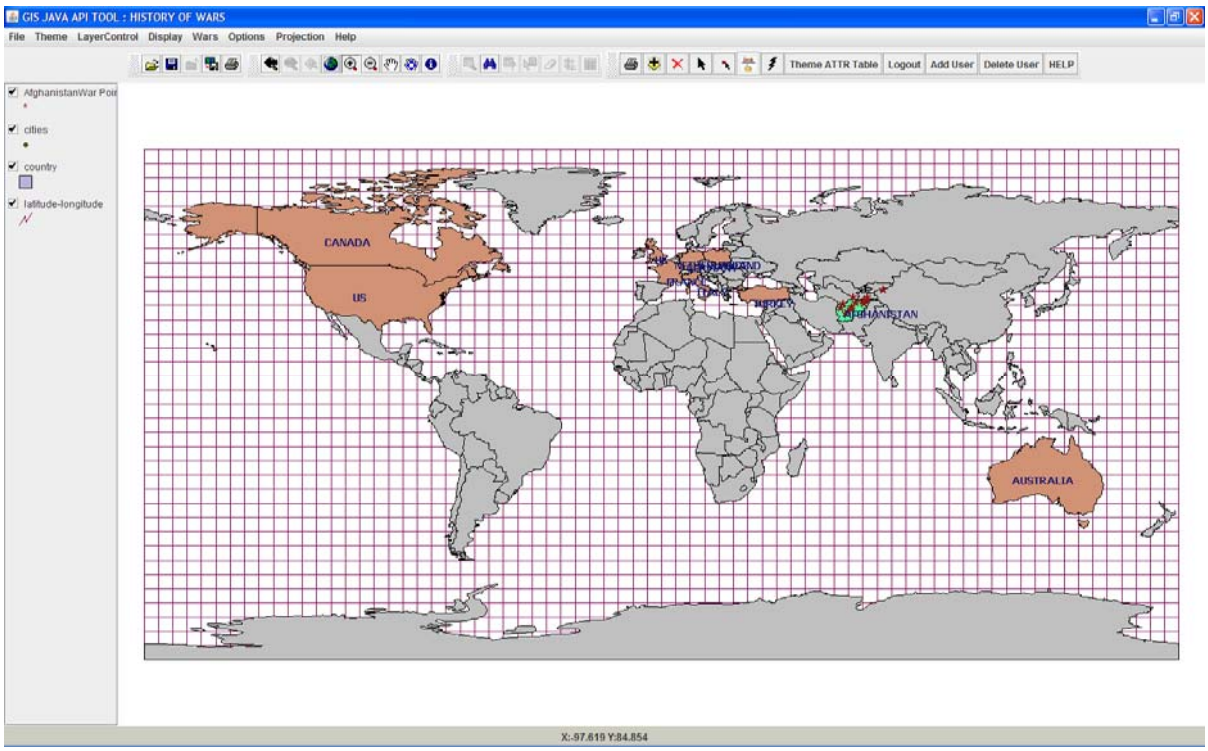

Figure 10.3. Co-ordinates display.

10.4 DRAW POINT OPTION

Consider a scenario in which the student wants to point to a location on the map for some battle site or latitude-longitude combination. This tool adds a 'circle' symbol on the map. A possible usage will be two students looking at a map and saying the following World War II battle was fought around here. We know that the tool doesn't provide information of all the battles fought during the war. The necessity of using a 'circle' symbol was to differentiate it with the 'star' symbol. After the user selects this tool, the user clicks on any location on the map and a "circle" will then be displayed on the map where the user clicked. The following **Corresponding Code** explains how this tool is implemented is:

```
import com.esri.mo2.ui.bean.Tool;

class DrawPoint1 extends Tool {

public DrawPoint1 () {
        sms.setType(SimpleMarkerSymbol.CIRCLE_MARKER);
        sms.setWidth(6);
        sms.setSymbolColor(Color.red);
        map.add(acetLayer); }
```

```
        public void mouseClicked(MouseEvent me) {
            pt = map.transformPixelToWorld(me.getX(),me.getY());
            acetLayer.repaint(); }
        Map map = ColdWar.map;
        SimpleMarkerSymbol sms = new SimpleMarkerSymbol();
        Point pt = new Point();
        AcetateLayer acetLayer = new AcetateLayer(){
            public void paintComponent(java.awt.Graphics g) {
                    if (pt != null) {
                            java.awt.Graphics2D g2d = (java.awt.Graphics2D)g;
                            g2d.setTransform(
map.getWorldToPixelTransform().toAffine());
                            g2d.setClip(map.getExtent());
                            sms.draw(pt,g2d,"");
                    }
            }
        };

}
```

10.5 HELP WINDOW AND TOOLTIPS

This functionality helps the students to understand the actual functionality of custom and GIS toolbars. Tooltips are provided to be able to view brief description of the button options on the toolbar. Help window has been provided if the user wants to know in detail the functionality of the each button in the toolbar. To open the help window, click About Menu and Help Menu item OR click the help button and click the toolbar option for which additional information is required. (See Figure 10.4).

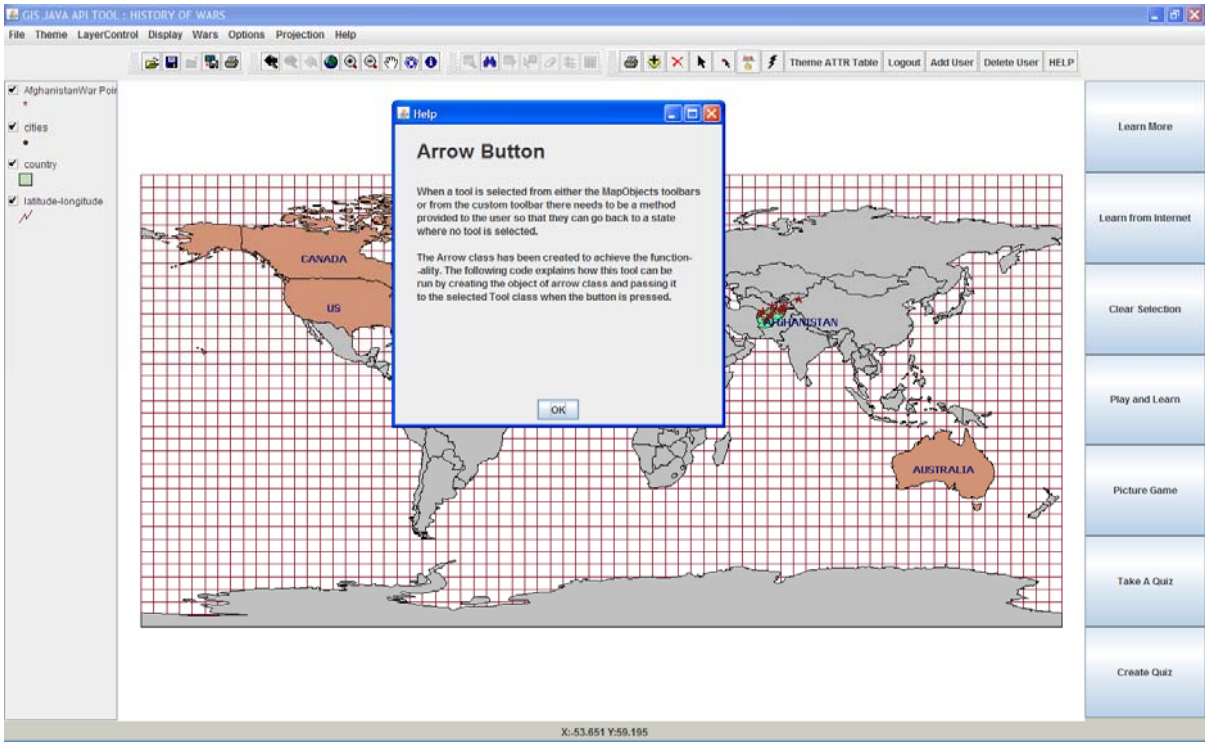
GIS JAVA API TOOL : HISTORY OF WARS
File Theme LayerControl Display Wars Options Projection Help
Theme ATTR Table
Logout
Add User
Delete User
HELP
AfghanistanWar Poir
cities
country
latitude-longitude
Help
Arrow Button
When a tool is selected from either the MapObjects toolbars or from the custom toolbar there needs to be a method provided to the user so that they can go back to a state where no tool is selected.
The Arrow class has been created to achieve the function--ality. The following code explains how this tool can be run by creating the object of arrow class and passing it to the selected Tool class when the button is pressed.
OK
CANADA
US
AUSTRALIA
Learn More
Learn from Internet
Clear Selection
Play and Learn
Picture Game
Take A Quiz
Create Quiz
X:-53.651 Y:59.195

Figure 10.4. Help window.

CHAPTER 11

SCREENSHOTS

11.1 LOGIN SCREEN

The GIS Java Multimedia Tool starts with the login screen which appears to the user when the user double-clicks the .jar/.exe file. The user enters the username and password credentials and clicks the Login button. Depending on the user credentials the user is directed to the corresponding windows. The user either signs in as an Admin or a Normal User.

- Logging as Admin: The user performs all the functions as a normal user would do and also has privileges to create and open quizzes. The Admin also has privilege to delete and create users. (see Figure 11.1).

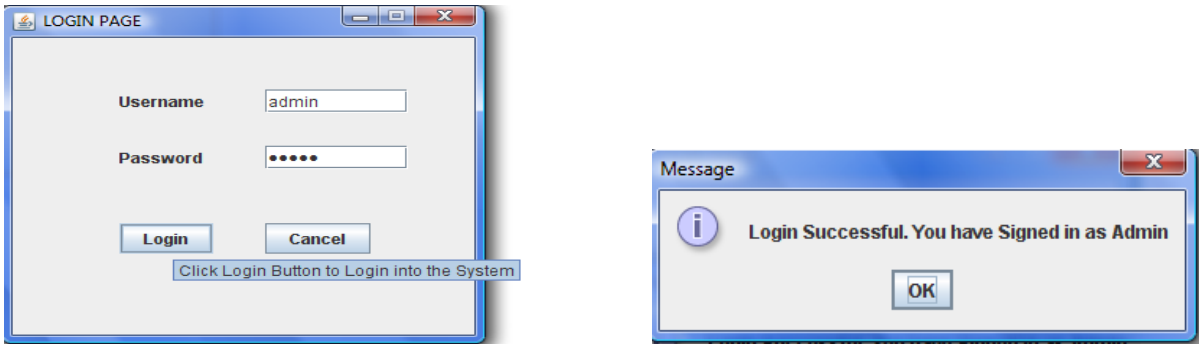

Figure 11.1. Login page and login successful dialog.

- Logging as Student: This is a student account. The student can view the map and performs various operations. The student can take quizzes and learn while playing picture game and Play and Learn.

11.2 SELECTION MENU

The Selection Menu window appears when the user logs in as either an Admin or Normal User. At this window the user selects the war he wants to view and perform operations (see Figure 11.2).

11.3 DEFAULT MAP VIEW

The user is transferred to Default Map View (see Figure 11.3) when the users selects a war from the Selection Menu. The map is shown depending on the selection from the user.

Figure 11.2. Selection menu screen.

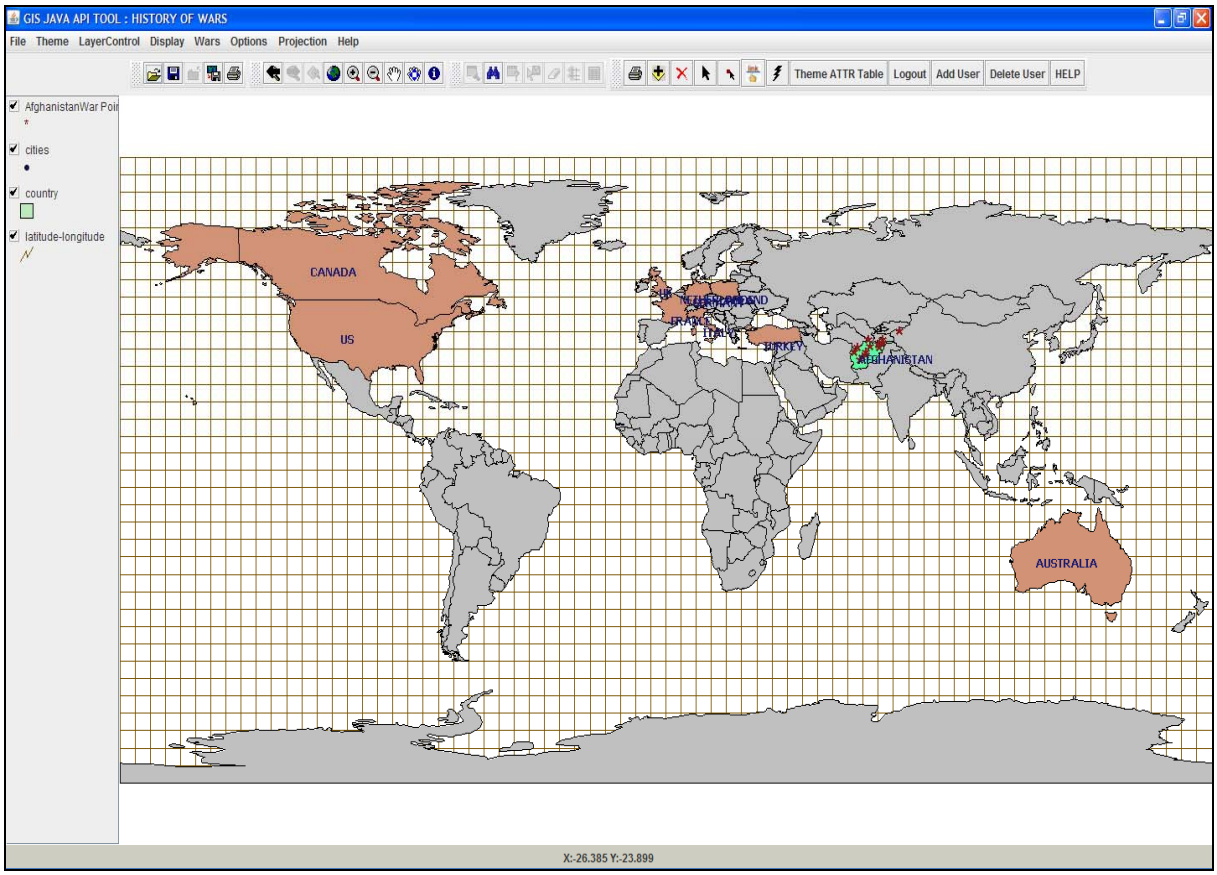

Figure 11.3. Default map view.

The countries that lost the war are displayed in green color while the countries who lost the war are displayed in red brick color. The map shows the battles sites with "*" symbol, GIS toolbars and custom toolbars to enhance usability. The menu options also help the user to perform operations on the map.

- **Zoom to full Extent** – Bring the map to its default view (see Figure 11.4). Zoom to full extent button is mainly used to return to default view from zoom in and zoom out options.

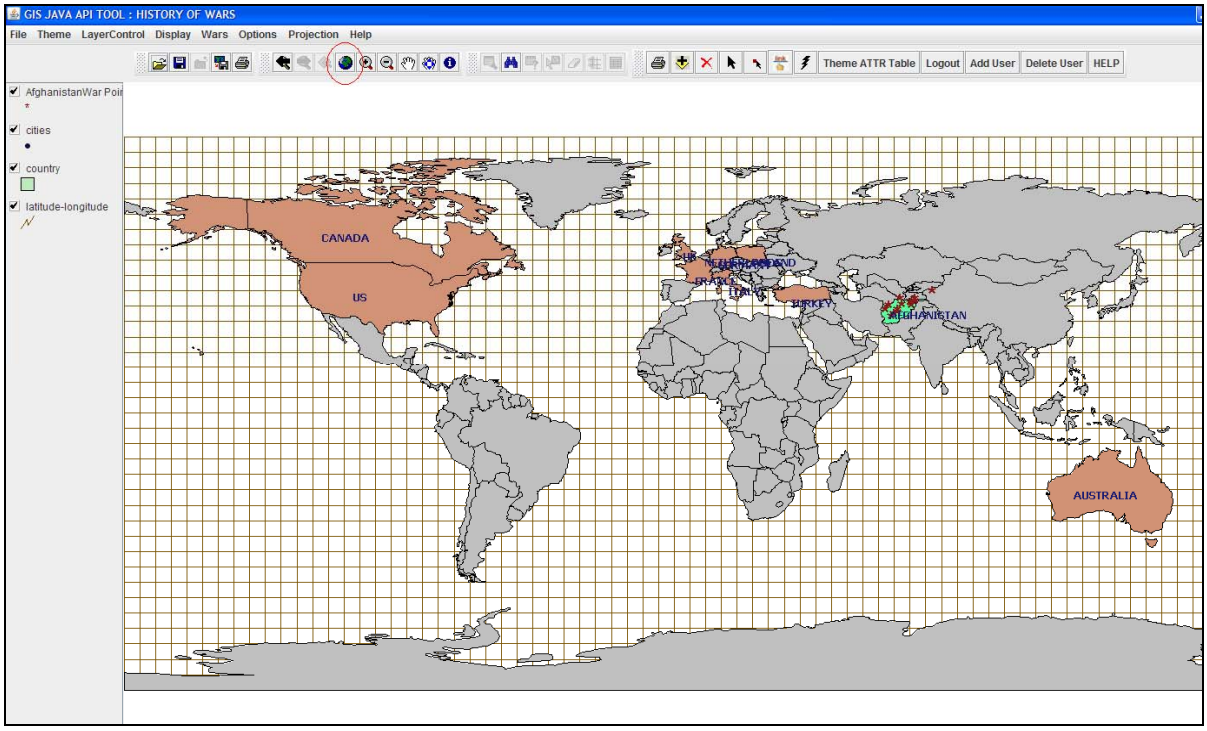

Figure 11.4. Zoom to full extent option.

- **Zoom in**: Used for Zooming on the map. Draw a square on the area or click on the area you want to zoom in. (see Figure 11.5).
- **Zoom out**: Used for Zooming out from the map from the zoomed area from Zoom In functionality. Draw a square on the area or click on the area you want to zoom out (see Figure 11.6).
- **Hotlink**: Click the hotlink button and then click on a battle site. Don't forget to click the layer on the left panel. A window will pop up giving detailed description of the battle (see Figures 11.7 and 11.8).
- **Arrow button**: Used for De-selecting the hotlink option and move back to normal arrow cursor (see Figure 11.9).
- **Print map**: The print map button allows the user to print the map from the system (see Figure 11.10).

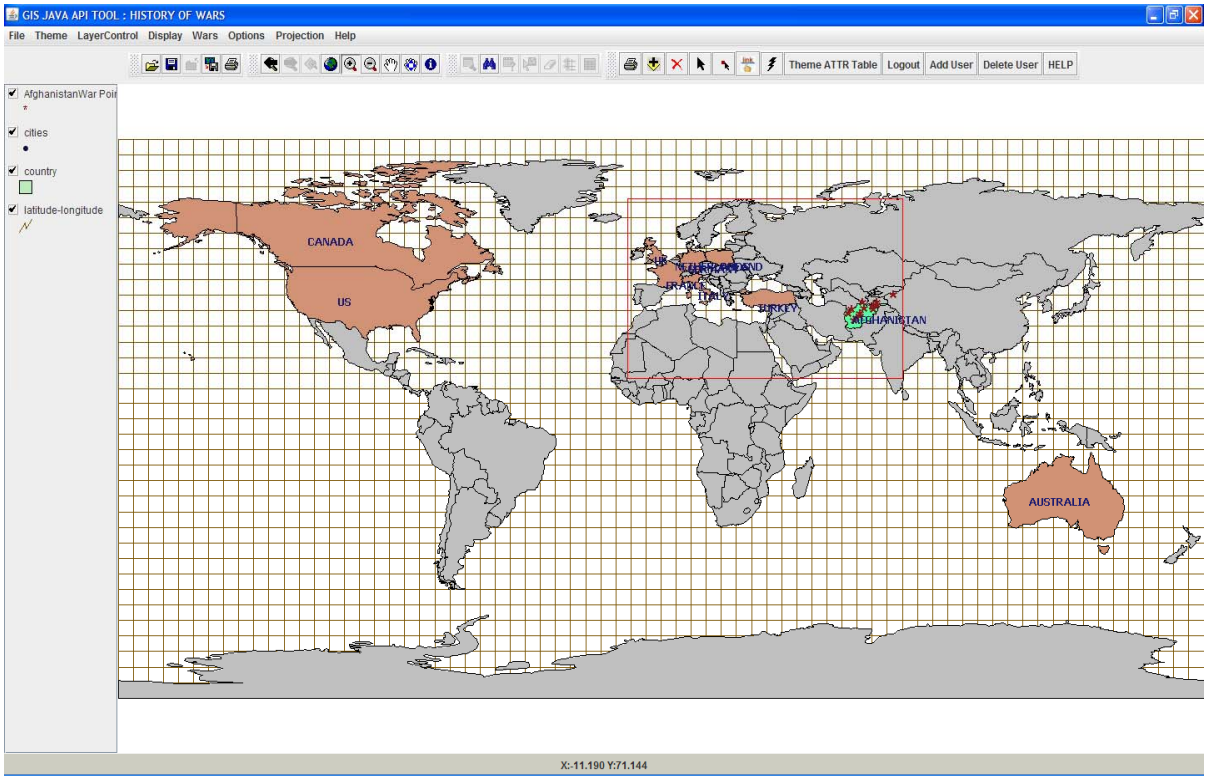

Figure 11.5. Zoom in option.

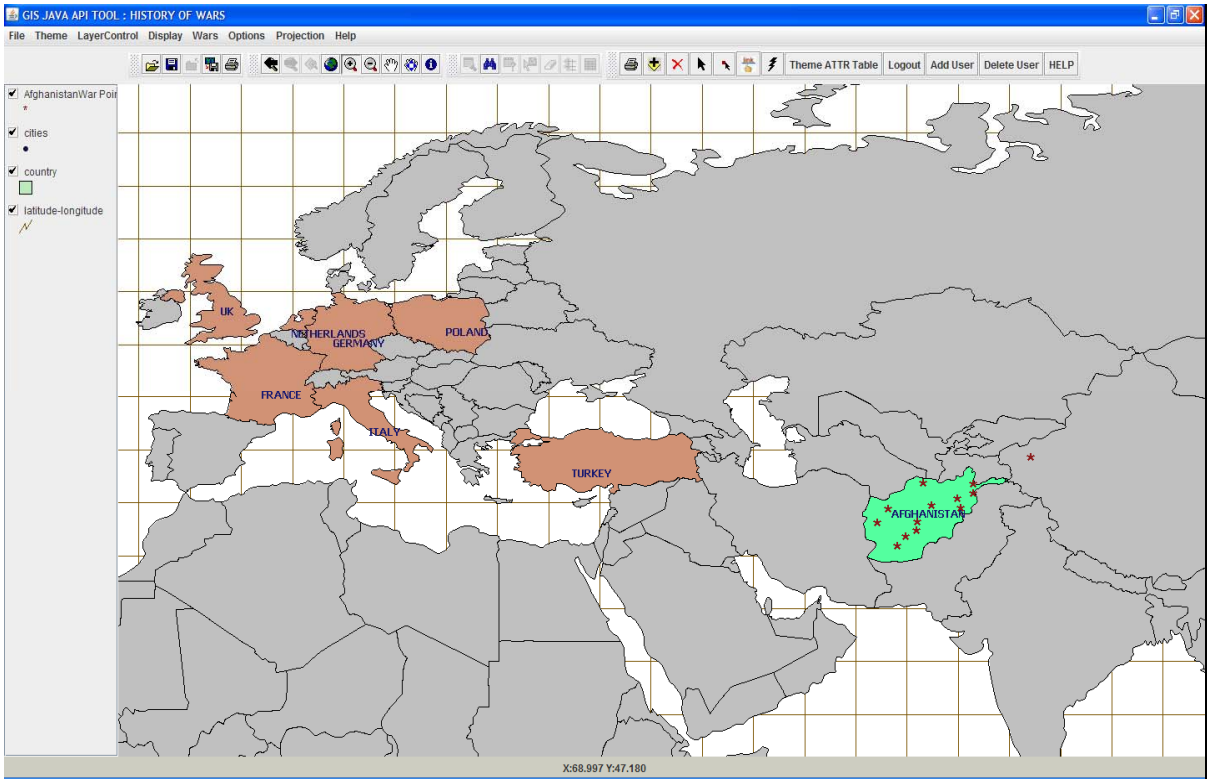

Figure 11.6. Zoom out option.

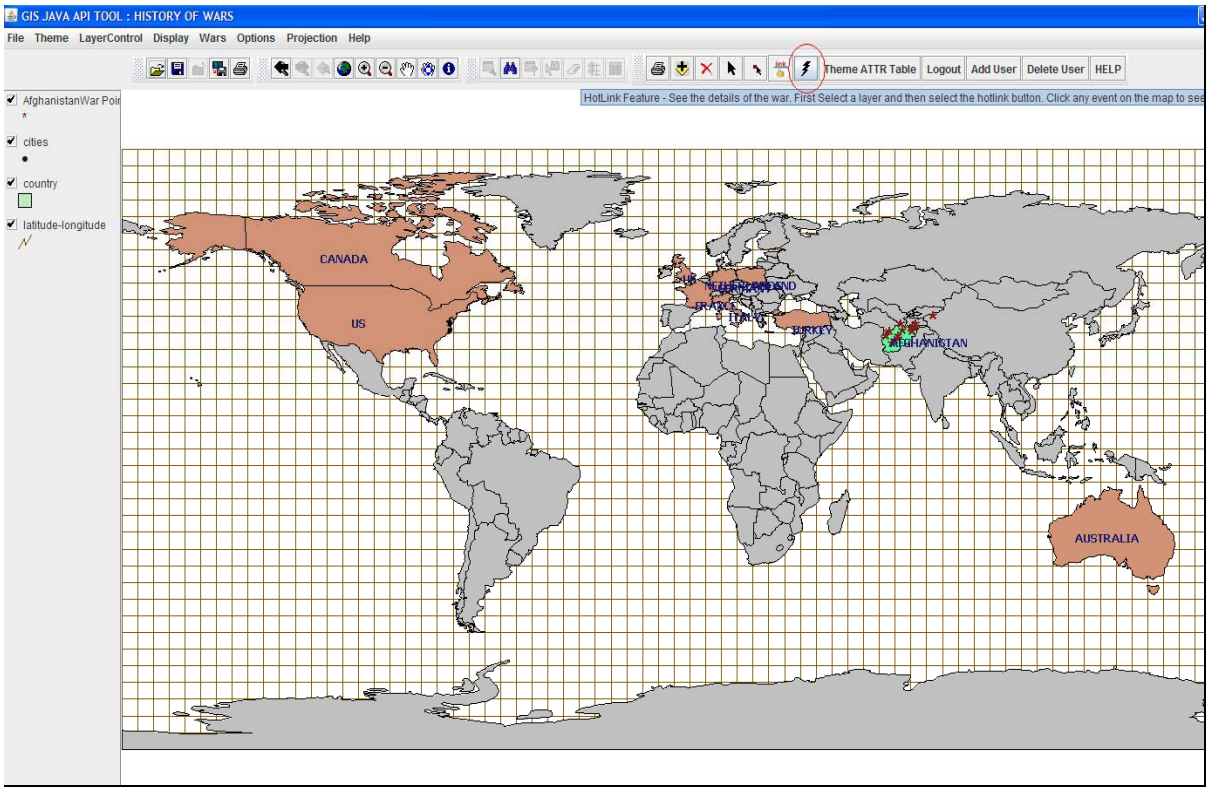
GIS JAVA API TOOL : HISTORY OF WARS
File Theme LayerControl Display Wars Options Projection Help
Theme ATTR Table
Logout
Add User
Delete User
HELP
HotLink Feature - See the details of the war. First Select a layer and then select the hotlink button. Click any event on the map to see
AfghanistanWar Poir
cities
country
latitude-longitude
CANADA
US
AUSTRALIA

Figure 11.7. Hotlink option.

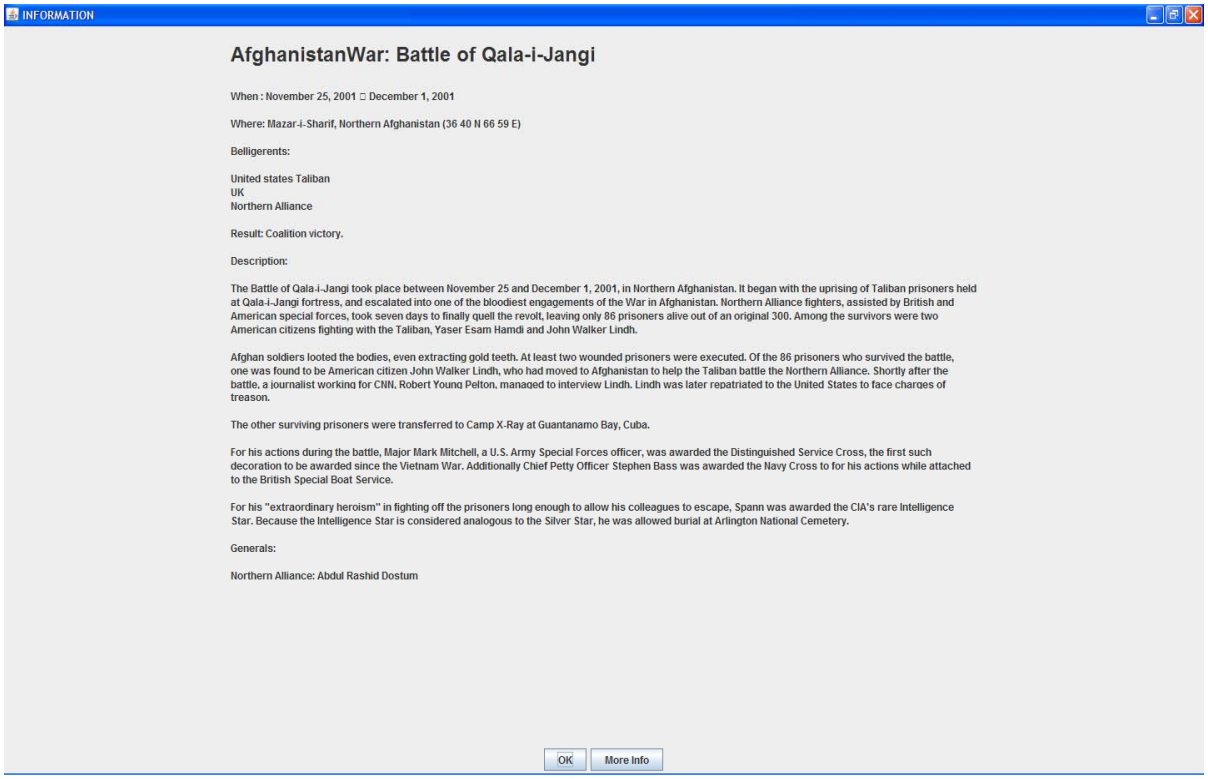
INFORMATION
AfghanistanWar: Battle of Qala-i-Jangi
When : November 25, 2001 □ December 1, 2001
Where: Mazar-i-Sharif, Northern Afghanistan (36 40 N 66 59 E)
Belligerents:
United states Taliban
UK
Northern Alliance
Result: Coalition victory.
Description:
The Battle of Qala-i-Jangi took place between November 25 and December 1, 2001, in Northern Afghanistan. It began with the uprising of Taliban prisoners held at Qala-i-Jangi fortress, and escalated into one of the bloodiest engagements of the War in Afghanistan. Northern Alliance fighters, assisted by British and American special forces, took seven days to finally quell the revolt, leaving only 86 prisoners alive out of an original 300. Among the survivors were two American citizens fighting with the Taliban, Yaser Esam Hamdi and John Walker Lindh.
Afghan soldiers looted the bodies, even extracting gold teeth. At least two wounded prisoners were executed. Of the 86 prisoners who survived the battle, one was found to be American citizen John Walker Lindh, who had moved to Afghanistan to help the Taliban battle the Northern Alliance. Shortly after the battle, a journalist working for CNN, Robert Young Pelton, managed to interview Lindh. Lindh was later repatriated to the United States to face charges of treason.
The other surviving prisoners were transferred to Camp X-Ray at Guantanamo Bay, Cuba.
For his actions during the battle, Major Mark Mitchell, a U.S. Army Special Forces officer, was awarded the Distinguished Service Cross, the first such decoration to be awarded since the Vietnam War. Additionally Chief Petty Officer Stephen Bass was awarded the Navy Cross to for his actions while attached to the British Special Boat Service.
For his "extraordinary heroism" in fighting off the prisoners long enough to allow his colleagues to escape, Spann was awarded the CIA's rare Intelligence Star. Because the Intelligence Star is considered analogous to the Silver Star, he was allowed burial at Arlington National Cemetery.
Generals:
Northern Alliance: Abdul Rashid Dostum
OK
More Info

Figure 11.8. Window opened on clicking Hotlink.

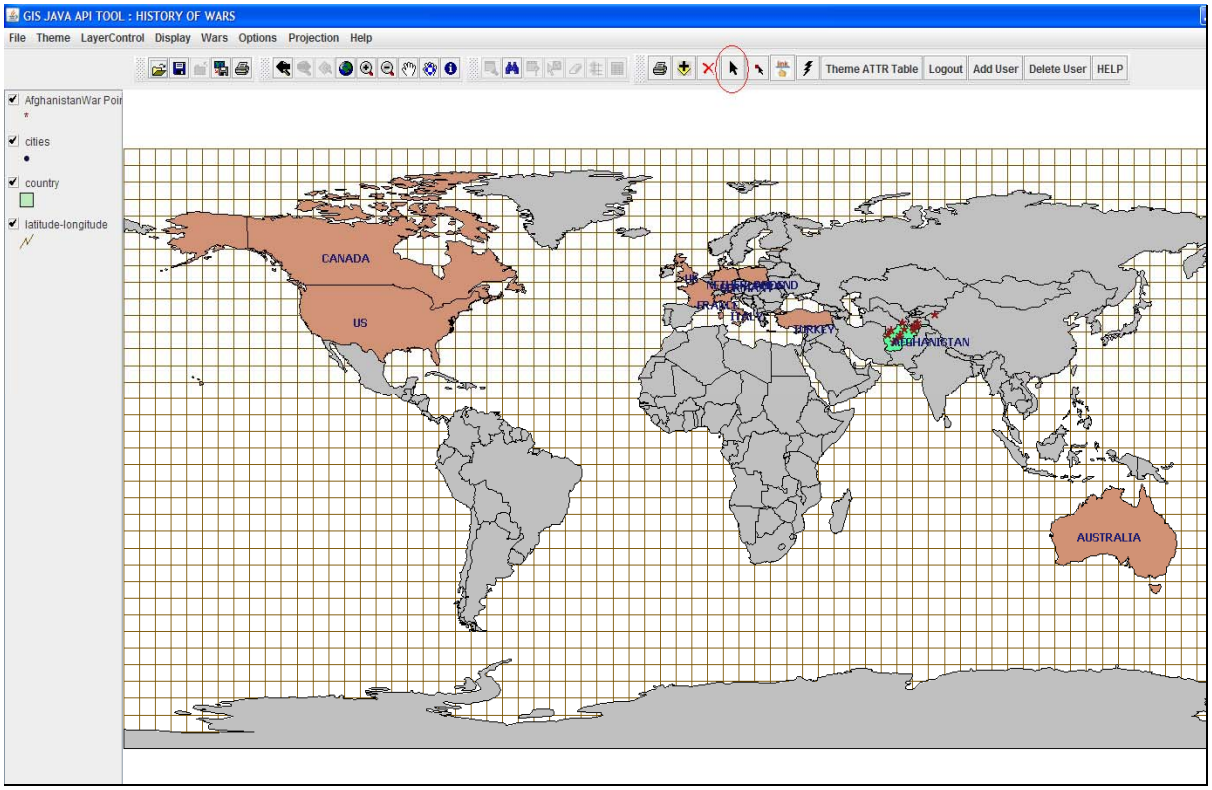

Figure 11.9. Arrow button.

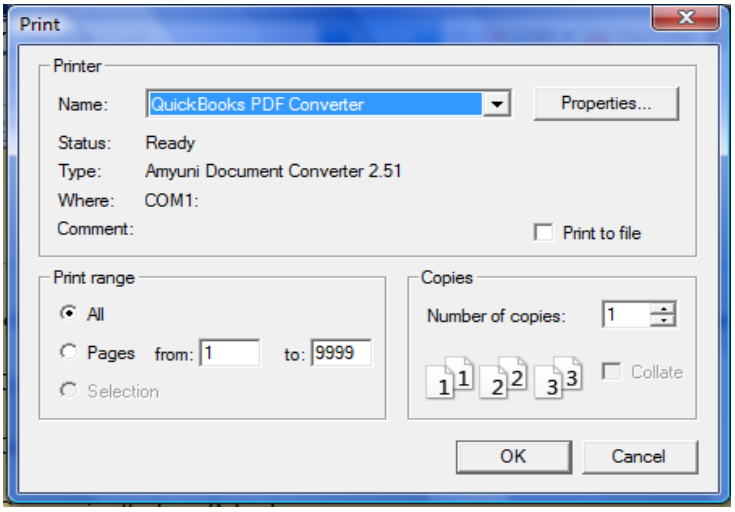

Figure 11.10. Print option.

- **Pan Button**: Select the pan button to drag the area on the map.
- **Remove layer**: Select the layer to be removed from the map and click the Remove layer button. The layer is removed from the map. The layer can be added to the map by using the add Layer option. If the war shape file is removed, click on the wars menu and select one of the wars from the list.

- **Add Layer**: Browse to the shape file you want to add to the map when the Add layer button is selected. The layer is added on the map.
- **Hyperlink**: When the Hyperlink button is clicked the system opens up a web page depending on the battle site selected by the user.
- **Identify tool**: Click on the identify tool and click on any location on the map. A pop-up window describing that particular location is displayed (see Figure 11.11).

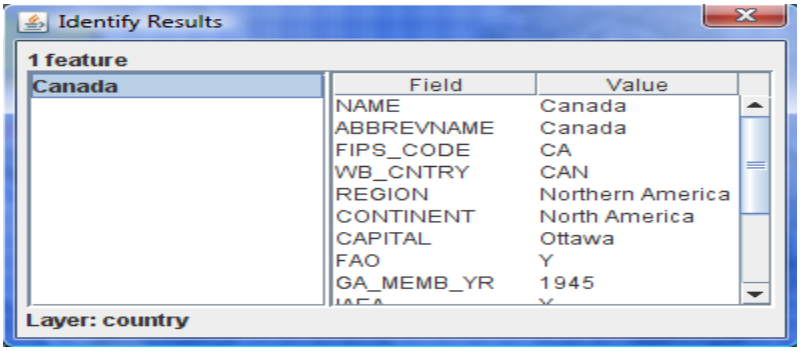

Figure 11.11. Identity tool.

- **Pop-up functionality**: To use the pop-up functionality the user clicks the battle site. A pop-up window appears with war information and battle fought along with the Summary button. To view the information about a particular battle click on the battle. Click the summary button to view the summary of the battle (see Figure 11.12).

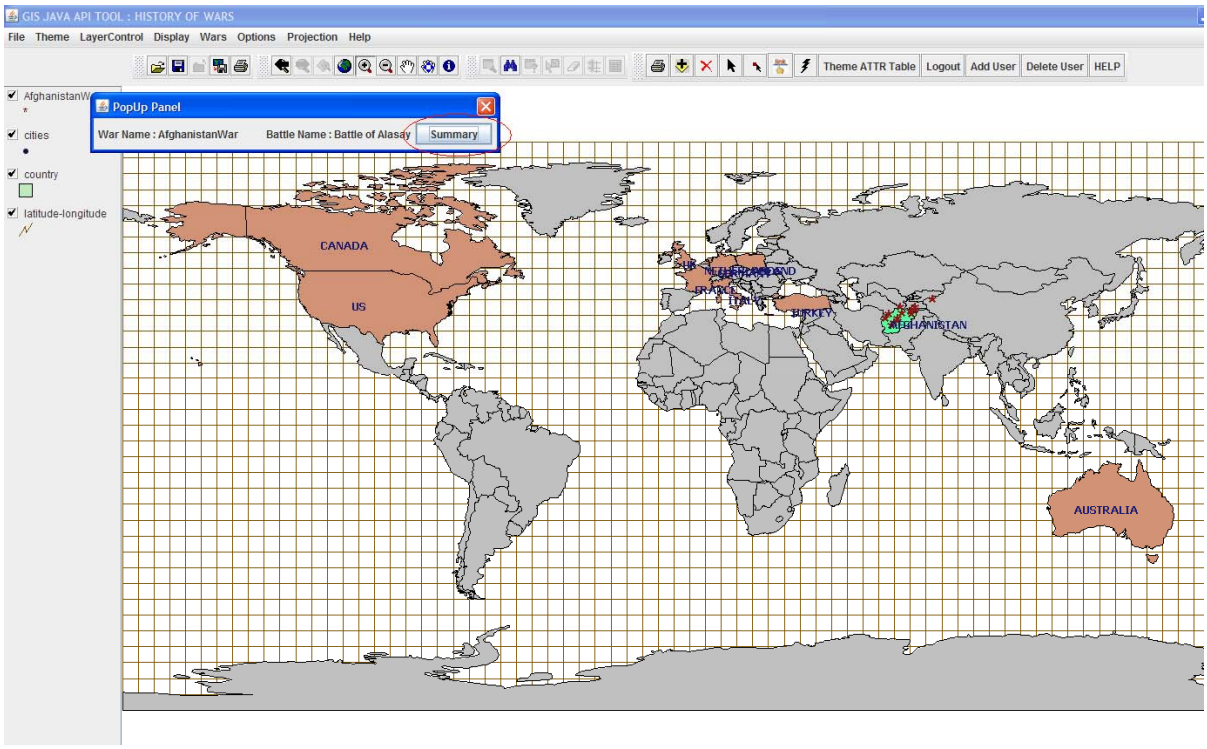

Figure 11.12. Pop-up functionality.

11.4 ADD USER

When the User logs in as an Admin this option is available. Clicking on the Add User button on the Default Map View the system opens up the Add User window (see Figure 11.13). The Admin can enter the username and password of the new user being added to the system. The user should enter correct password and confirm password to proceed. Click Cancel to cancel adding the user to the system.

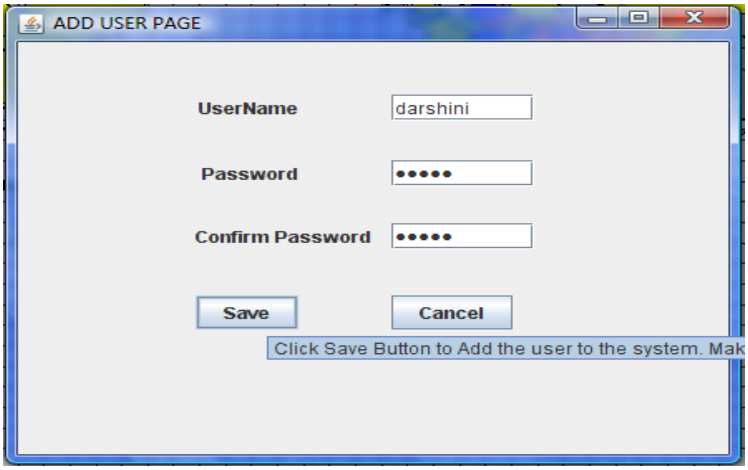

Figure 11.13. Add user screen.

11.5 DELETE USER

When the User logs in as an Admin this option is available. Clicking on the Delete User button on the Default Map View the system opens up the Delete User window (see Figure 11.14). The Admin can enter the username and password of the user being removed to the system. Click Cancel to cancel adding the user to the system.

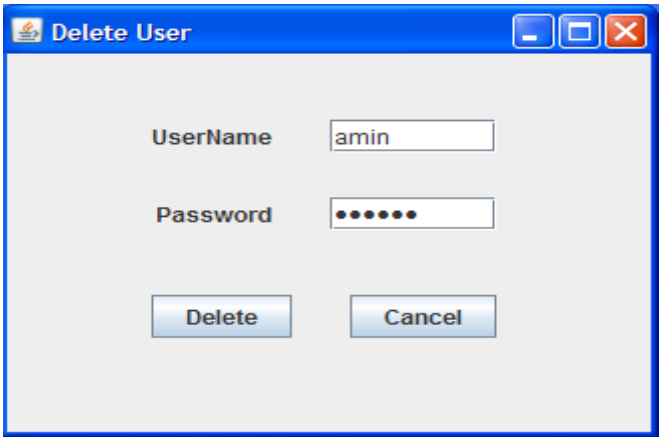

Figure 11.14. Delete user.

11.6 LOGOUT

Click on the logout button to log out from the system. The login screen appears (see Figures 11.15 and 11.16). Once logged out from the system the User can again sign in or click the Cancel button to exit from the system.

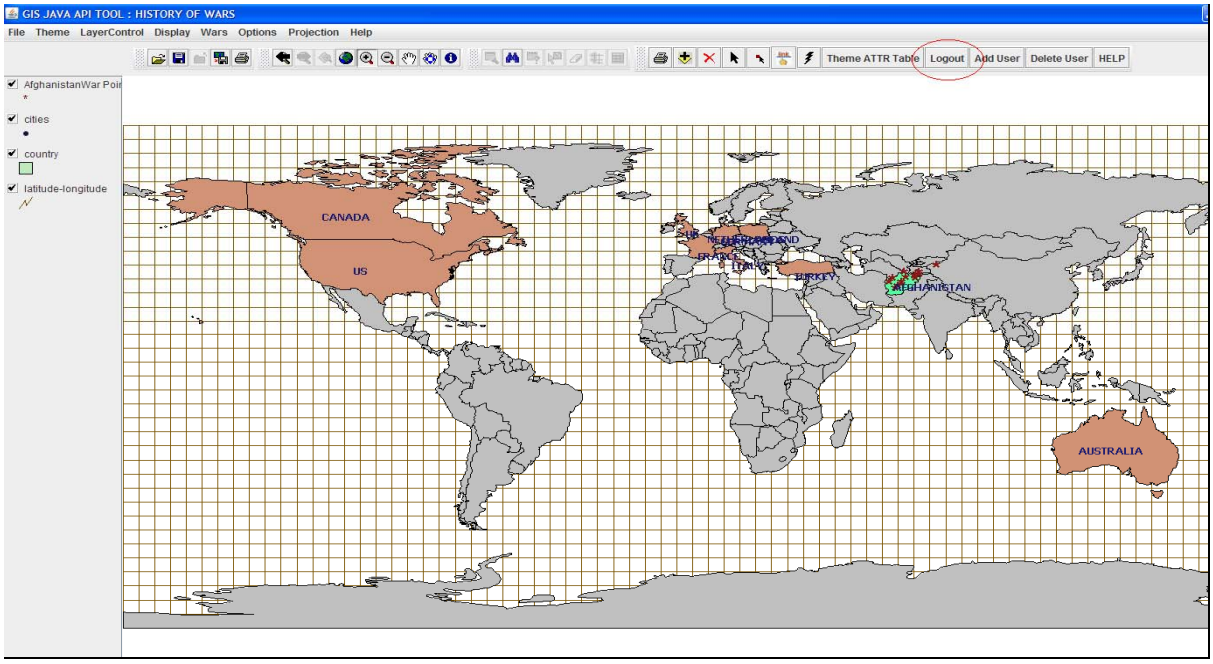

Figure 11.15. Logout option.

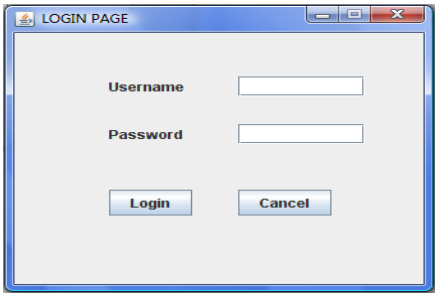

Figure 11.16. Login screen.

11.7 ADD OPTIONS PANEL

Clicking on the Options Menu on the Default Map view and selecting the Add options panel menu list, a new panel will be added on the right hand side of the map to be able to perform various operations on the war.

Click the Zoom to full extent button to fit the map with the options panel on the Map (see Figures 11.17 and 11.18). Following are options in the Options Panel.

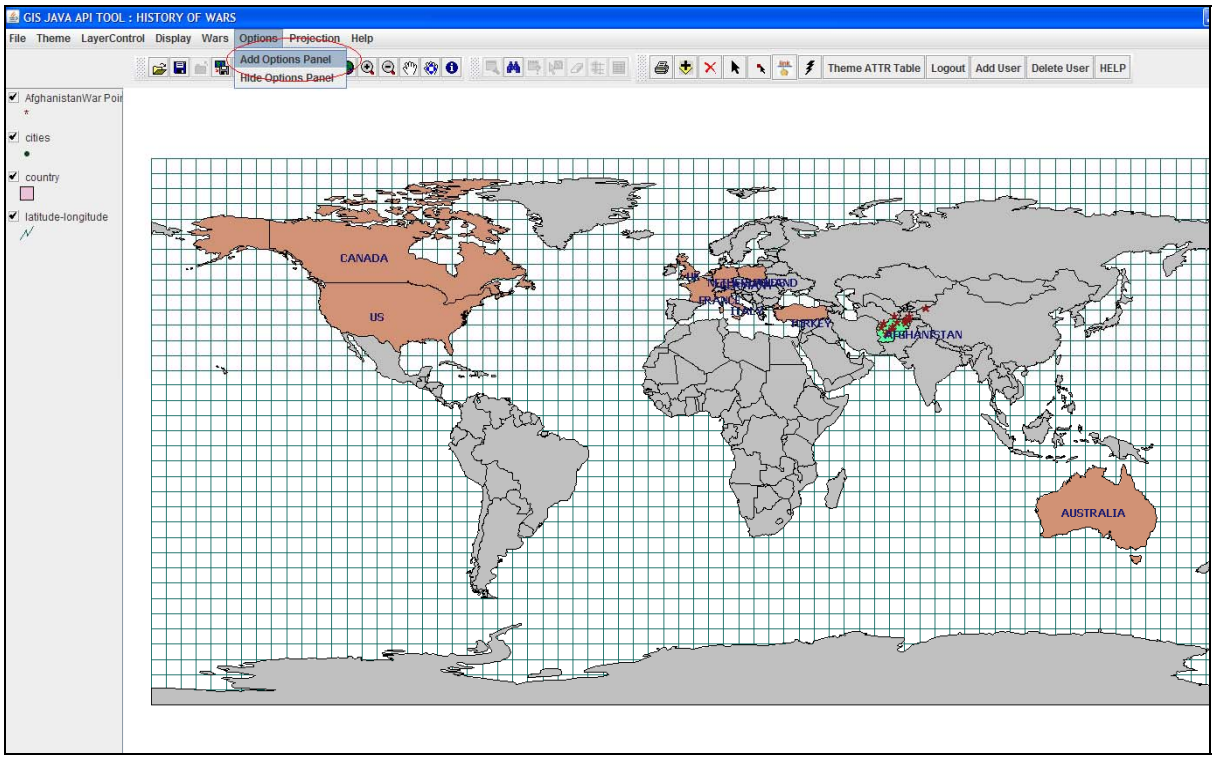

Figure 11.17. Add options panel.

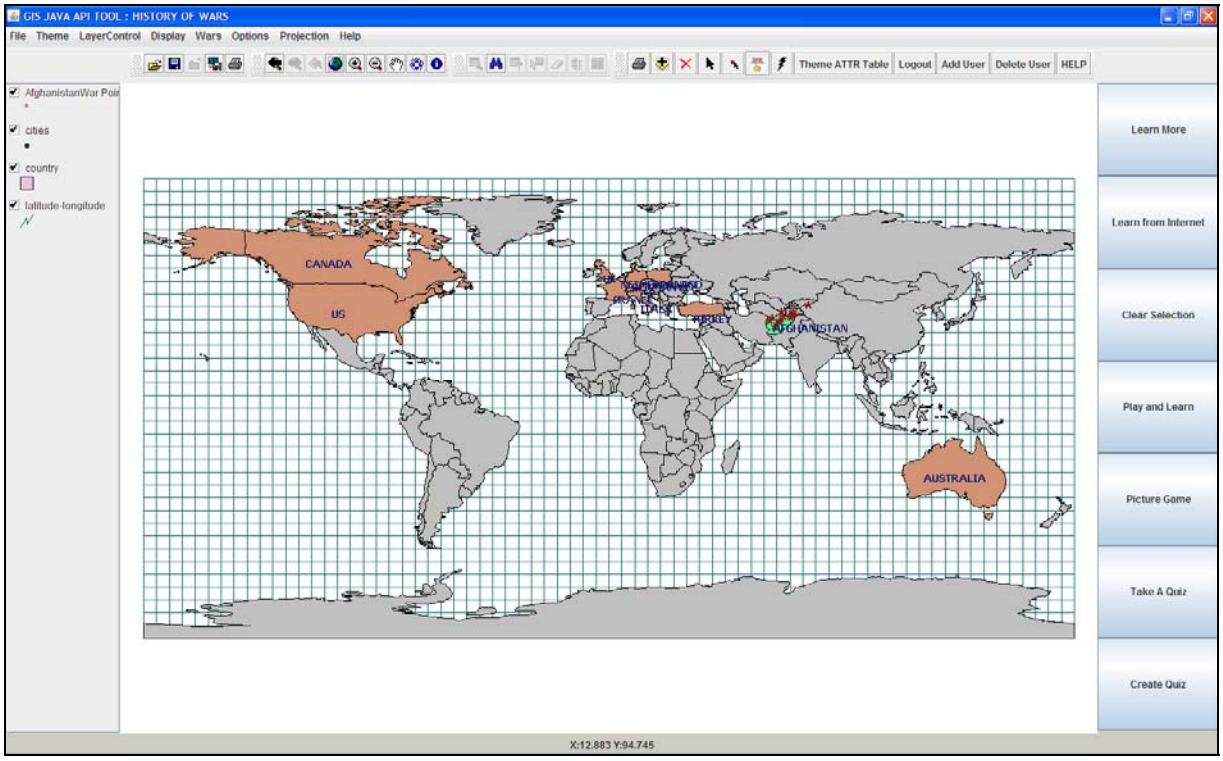

Figure 11.18. Options panel with default map view.

11.7.1 Learn More

Web page for the current war (see Figure 11.19) open up when “Learn More” option is clicked on the options panel. The user can view detailed description of the war including Introduction, Causes of the war, and Main events of the war, Consequences of the war, images and videos of the war by selecting various options on the web page (see Figure 11.20).

Figure 11.19. Wars main page -1.

11.7.2 Learn More from Internet

Wikipedia page for the current war is opened by clicking on the Learn More from Internet button. (see Figure 11.21).

11.7.3 Create Quiz

This option is available only to the Administrator. When the professor clicks on the Create Quiz option, the user is prompted for faculty password (see Figure 11.22). On entering a correct faculty password, Create Quiz web page is displayed. Enter the question; answer options and corresponding feedback to answers (see Figure 11.23). Click Add question button to add question to the quiz (see Figure 11.24). Once the professor has

HISTORY OF WARS - Windows Internet Explorer provided by Life Technologies
Helix High School
JAVA API IN GIS MAP TOOL: WORLD WAR HISTORY
MAIN MENU
HOME
INTRODUCTION
PARTICIPANTS
CAUSES
MAIN EVENTS
CONSEQUENCES
IMAGES
VIDEOS
ABOUT HELIX HIGH SCHOOL
CAUSES FOR GULF WAR
1) Afghan Civil War
After Soviet troops withdrew in 1989, the Kabul government fell to the mujahideen in 1992. In the years that followed, various factions of the mujahedeen fought each other for control. In 1996 the Taliban, an Islamic fundamentalist movement formed in 1994, captured the capital Kabul and subsequently overran approximately 90% of the country, leaving only a small corner in the northeast under control of the Northern Alliance.
Although members of the international community, including the United States, initially viewed the Taliban as a potential source of stability for the war-ravaged country,their tolerance for hosting Islamic extremists combined with their reluctance to negotiate with their enemies soon soured this. In 1996, Osama bin Laden and his Al-Qaeda organization began using Taliban-controlled Afghanistan as a base of operations. Under the Taliban, al-Qaeda was able to use Afghanistan as a place to train and indoctrinate fighters, import weapons, coordinate with other jihadists, and plot terrorist actions.
After the August 1998 U.S. Embassy bombings were linked to bin Laden, President Bill Clinton ordered missile strikes on militant training camps in Afghanistan. U.S. officials pressed the Taliban to surrender bin Laden, and the international community imposed sanctions of the Taliban in 1999 calling for bin Laden to be surrendered to U.S. custody. The Taliban repeatedly rebuffed the demands, however.

Figure 11.20. Wars main page -2.

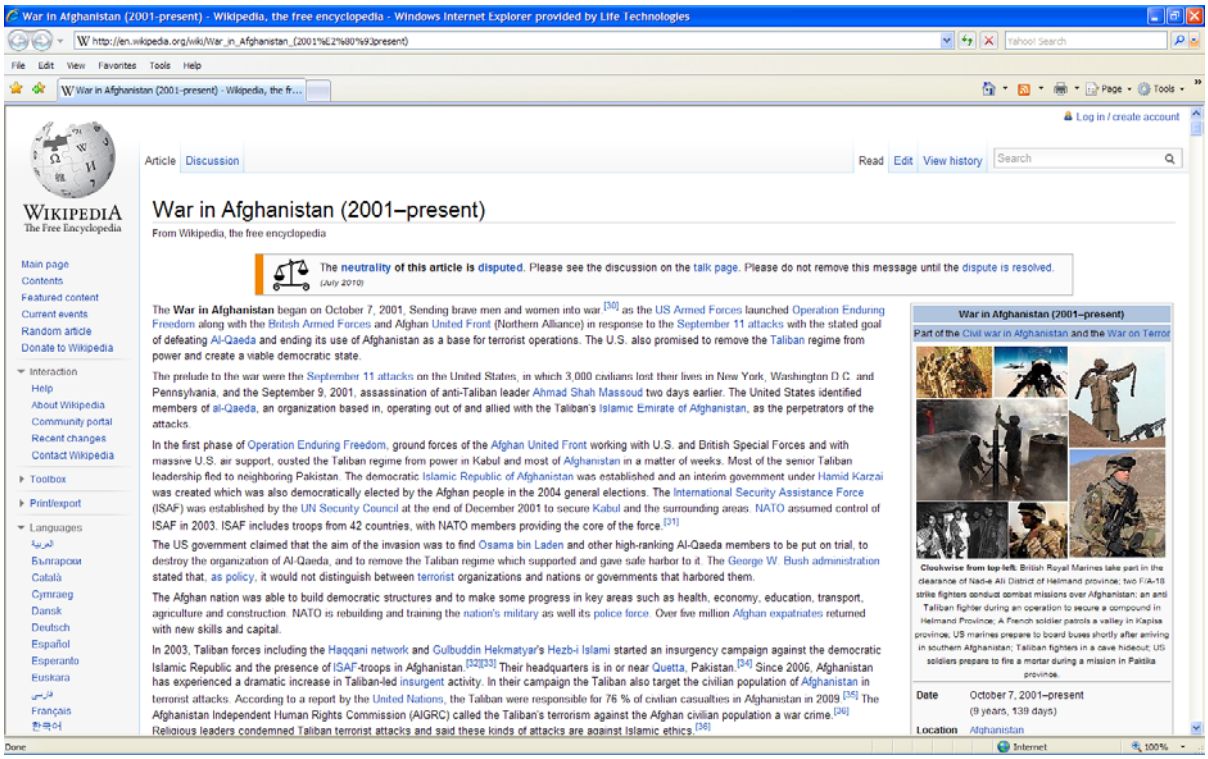
War in Afghanistan (2001-present) - Wikipedia, the free encyclopedia - Windows Internet Explorer provided by Life Technologies
WIKIPEDIA
The Free Encyclopedia
War in Afghanistan (2001–present)
From Wikipedia, the free encyclopedia
The neutrality of this article is disputed. Please see the discussion on the talk page. Please do not remove this message until the dispute is resolved.
The War in Afghanistan began on October 7, 2001, Sending brave men and women into war [30] as the US Armed Forces launched Operation Enduring Freedom along with the British Armed Forces and Afghan United Front (Northern Alliance) in response to the September 11 attacks with the stated goal of defeating Al-Qaeda and ending its use of Afghanistan as a base for terrorist operations. The U.S. also promised to remove the Taliban regime from power and create a viable democratic state.
War in Afghanistan (2001–present)
Part of the Civil war in Afghanistan and the War on Terror
Date October 7, 2001–present (9 years, 139 days)
Location Afghanistan

Figure 11.21. Learn more from Internet.

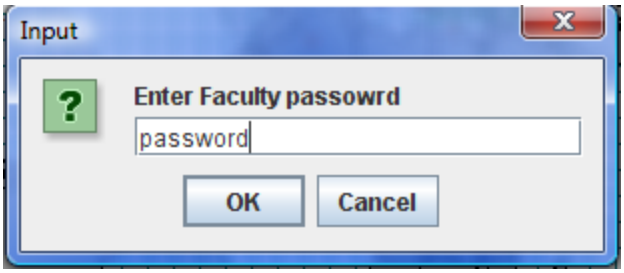

Figure 11.22. Verify user dialog.

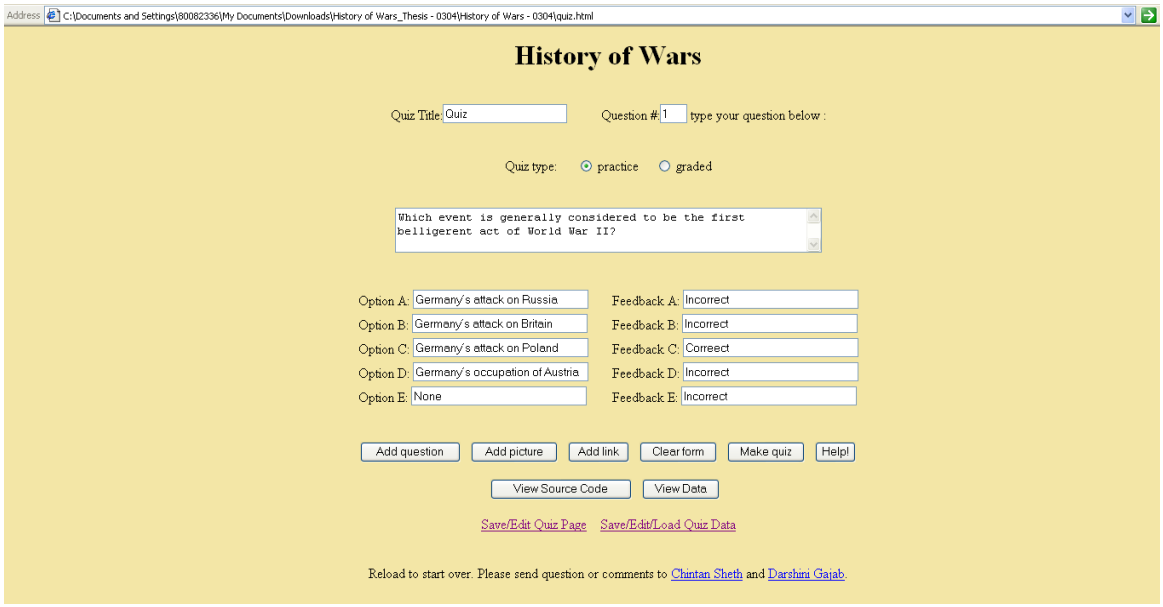
Address C:\Documents and Settings\80082336\My Documents\Downloads\History of Wars_Thesis - 0304\History of Wars - 0304\quiz.html
History of Wars
Quiz Title: Quiz
Question #: 1 type your question below :
Quiz type: practice graded
Which event is generally considered to be the first belligerent act of World War II?
Option A: Germany's attack on Russia
Option B: Germany's attack on Britain
Option C: Germany's attack on Poland
Option D: Germany's occupation of Austria
Option E: None
Feedback A: Incorrect
Feedback B: Incorrect
Feedback C: Correect
Feedback D: Incorrect
Feedback E: Incorrect
Add question
Add picture
Add link
Clear form
Make quiz
Help!
View Source Code
View Data
Save/Edit Quiz Page
Save/Edit/Load Quiz Data
Reload to start over. Please send question or comments to Chintan Sheth and Darshini Gajab.

Figure 11.23. Create quiz - 1.

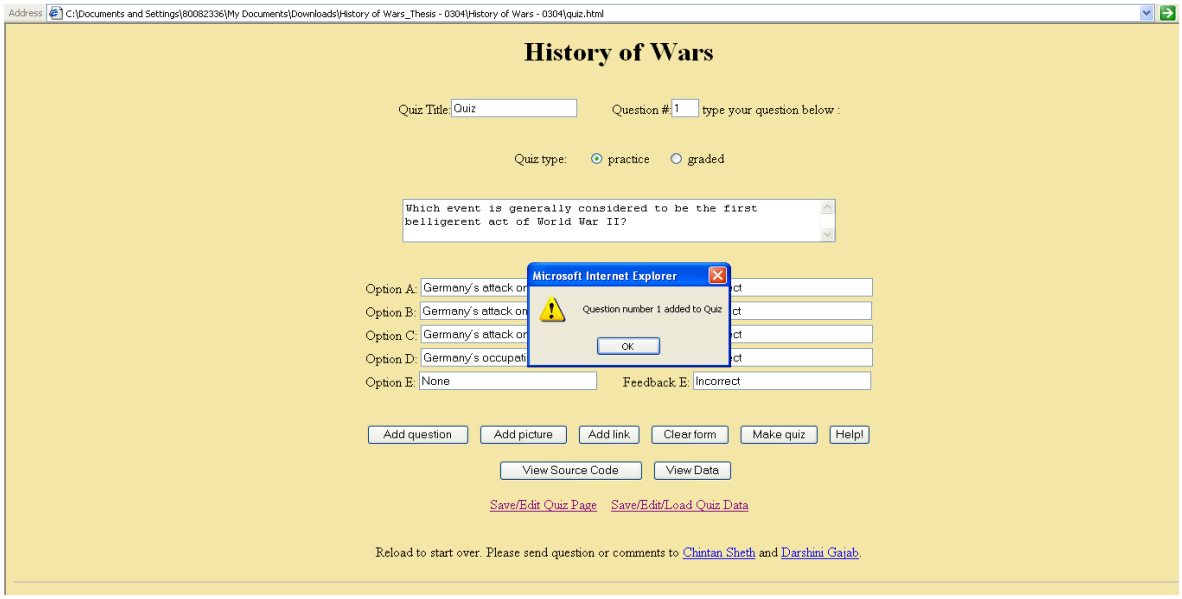
Address C:\Documents and Settings\80082336\My Documents\Downloads\History of Wars_Thesis - 0304\History of Wars - 0304\quiz.html
History of Wars
Quiz Title: Quiz
Question #: 1 type your question below :
Quiz type: practice graded
Which event is generally considered to be the first belligerent act of World War II?
Microsoft Internet Explorer
Question number 1 added to Quiz
OK
Option A: Germany's attack on
Option B: Germany's attack on
Option C: Germany's attack on
Option D: Germany's occupati
Option E: None
Feedback E: Incorrect
Add question
Add picture
Add link
Clear form
Make quiz
Help!
View Source Code
View Data
Save/Edit Quiz Page
Save/Edit/Load Quiz Data
Reload to start over. Please send question or comments to Chintan Sheth and Darshini Gajab.

Figure 11.24. Create quiz - 2.

completed adding questions to the quiz, click the Make quiz button. The professor can add images and links to the question by using the add image and add link button. When the user clicks the Make quiz button, the quiz is displayed on the screen. The user can then print the quiz or just view. The user is prompted to save the quiz to the local drive. The user enters the war (for which the quiz is created) and the filename by which the quiz is to be saved. The file is saved to the local drive. The professors can then open or print the quiz through the Take Quiz option later when needed.

Web page opened after clicking the Make Quiz button (see Figures 11.25 to 11.26).

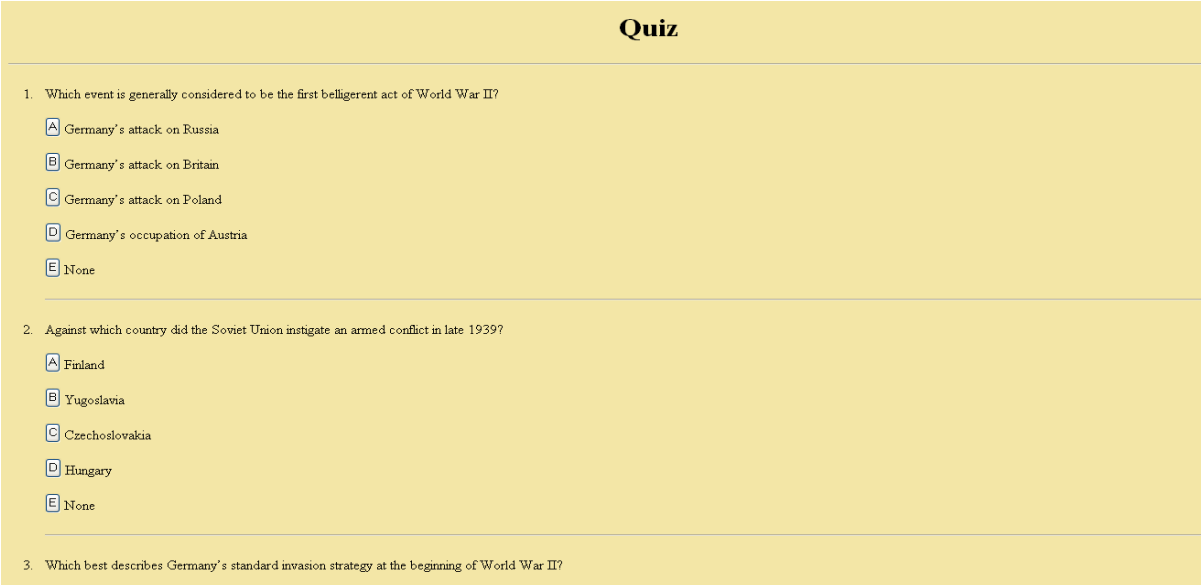
Quiz
1. Which event is generally considered to be the first belligerent act of World War II?
A Germany's attack on Russia
B Germany's attack on Britain
C Germany's attack on Poland
D Germany's occupation of Austria
E None
2. Against which country did the Soviet Union instigate an armed conflict in late 1939?
A Finland
B Yugoslavia
C Czechoslovakia
D Hungary
E None
3. Which best describes Germany's standard invasion strategy at the beginning of World War II?

Figure 11.25. Quiz prepared.

11.7.4 Take Quiz

This is authorized to the admin users. When the admin clicks on the Take Quiz option, the user is prompted for faculty password. On entering a correct faculty password, Select Quiz window is displayed (see Figure 11.27). The user selects the war and clicks the Select button (see Figure 11.28). All the quizzes created for that particular war are retrieved in the drop-down list. The User selects the quiz from the drop-down list and clicks the open button to open the quiz or print button to print the quiz.

Clicking on the Open button displays the Quiz window (see Figure 11.29) and Print button displays the print dialog as shown below (see Figure 11.30).

Figure 11.26. Save quiz option.

Figure 11.27. Take quiz - 1.

11.7.5 Picture Game

The picture Game in the system is used majorly to test the student's understanding of the wars and the generals involved in the war. The user clicks the Picture game option on the Add Options panel. A window opens with photo of a General and 4 options for the user to select from. The user selects 1 of the options. The system responds whether the answer is correct or wrong (see Figure 11.31).

Figure 11.28. Take quiz - 2.

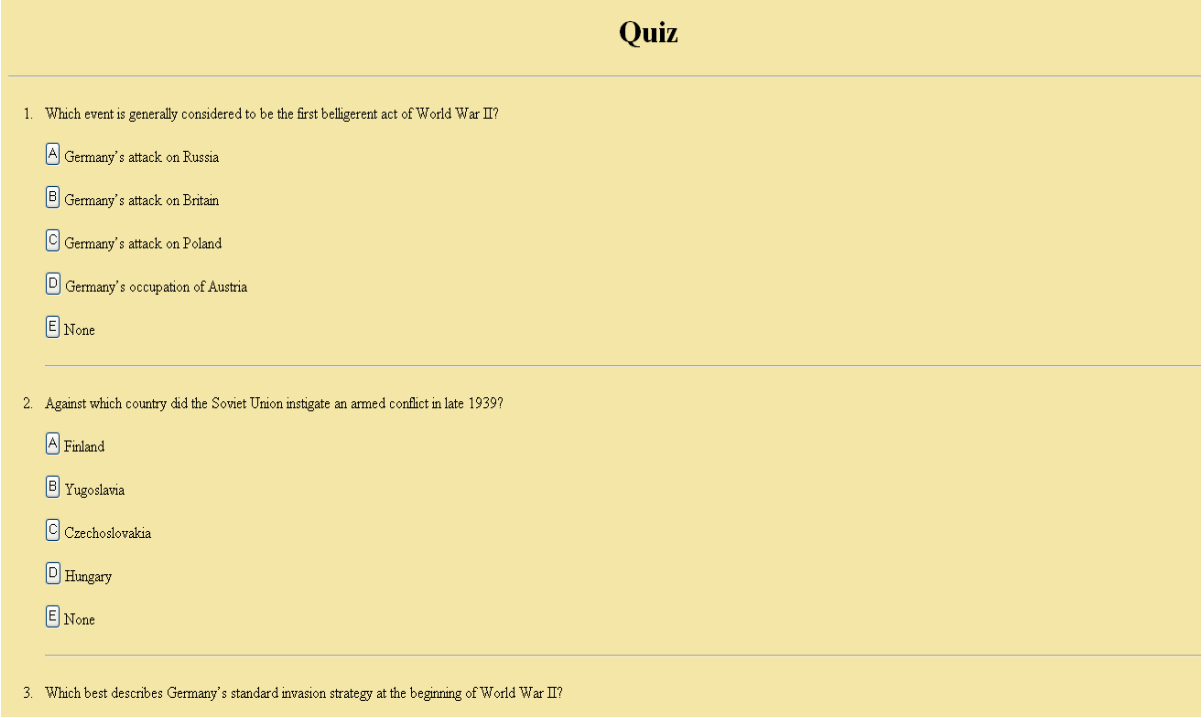
Quiz
1. Which event is generally considered to be the first belligerent act of World War II?
A Germany's attack on Russia
B Germany's attack on Britain
C Germany's attack on Poland
D Germany's occupation of Austria
E None
2. Against which country did the Soviet Union instigate an armed conflict in late 1939?
A Finland
B Yugoslavia
C Czechoslovakia
D Hungary
E None
3. Which best describes Germany's standard invasion strategy at the beginning of World War II?

Figure 11.29. Open quiz option.

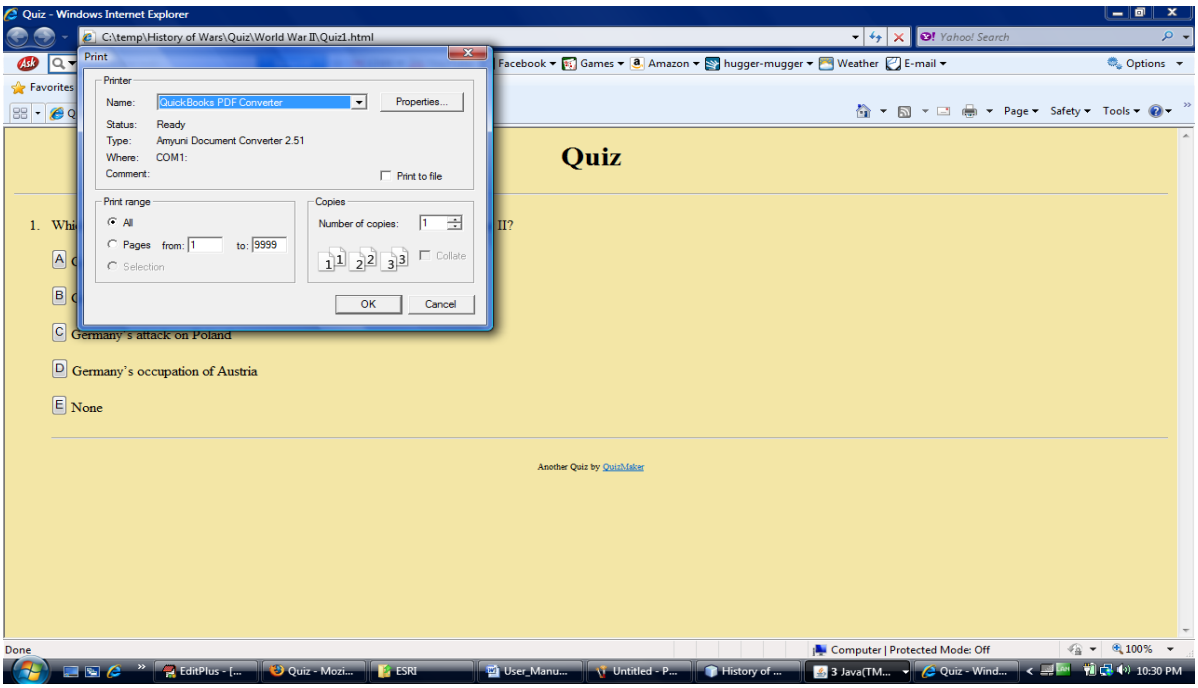

Figure 11.30. Print quiz.

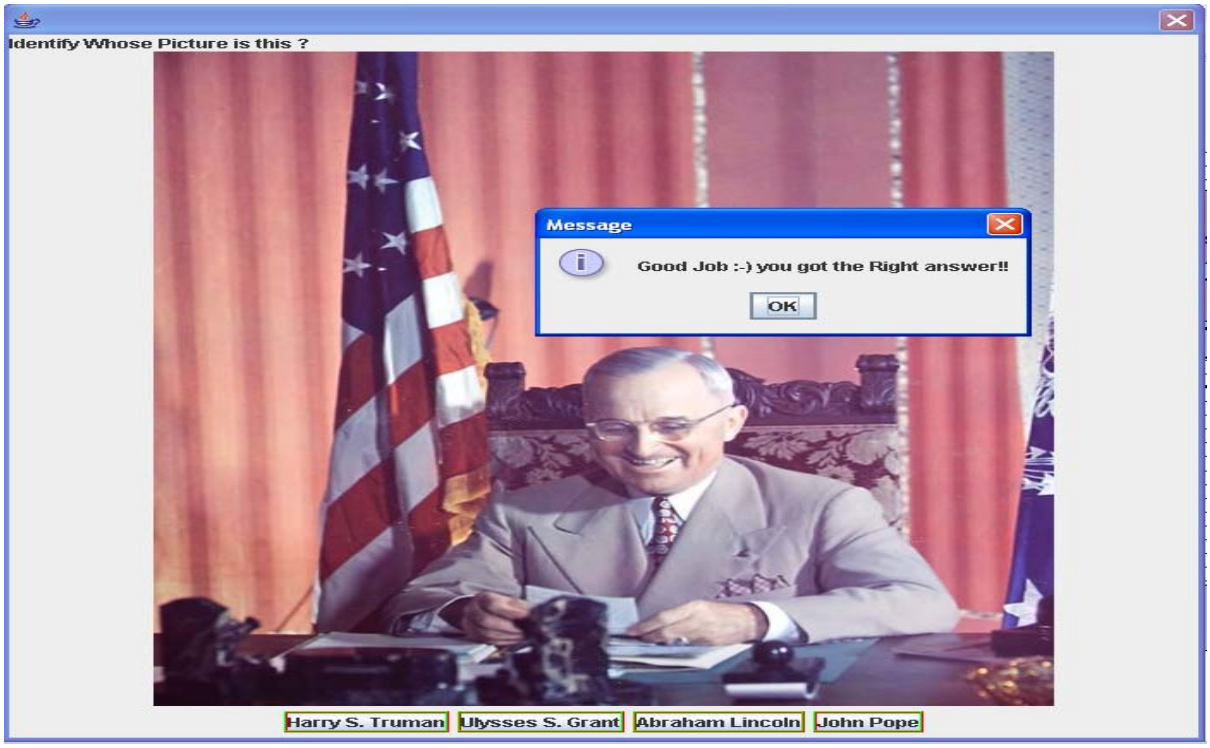

Figure 11.31. Picture game.

11.8 PLAY N LEARN OPTION

The Play N Learn is also an interactive Game used to test the understanding on the student (see Figures 11.32 to 11.34). The system asks a question to the student for the country in which a particular war is fought. If the user gives correct answer the system asks whether the user requires additional information. The system opens a corresponding web page for the war in case the user selects to view additional information.

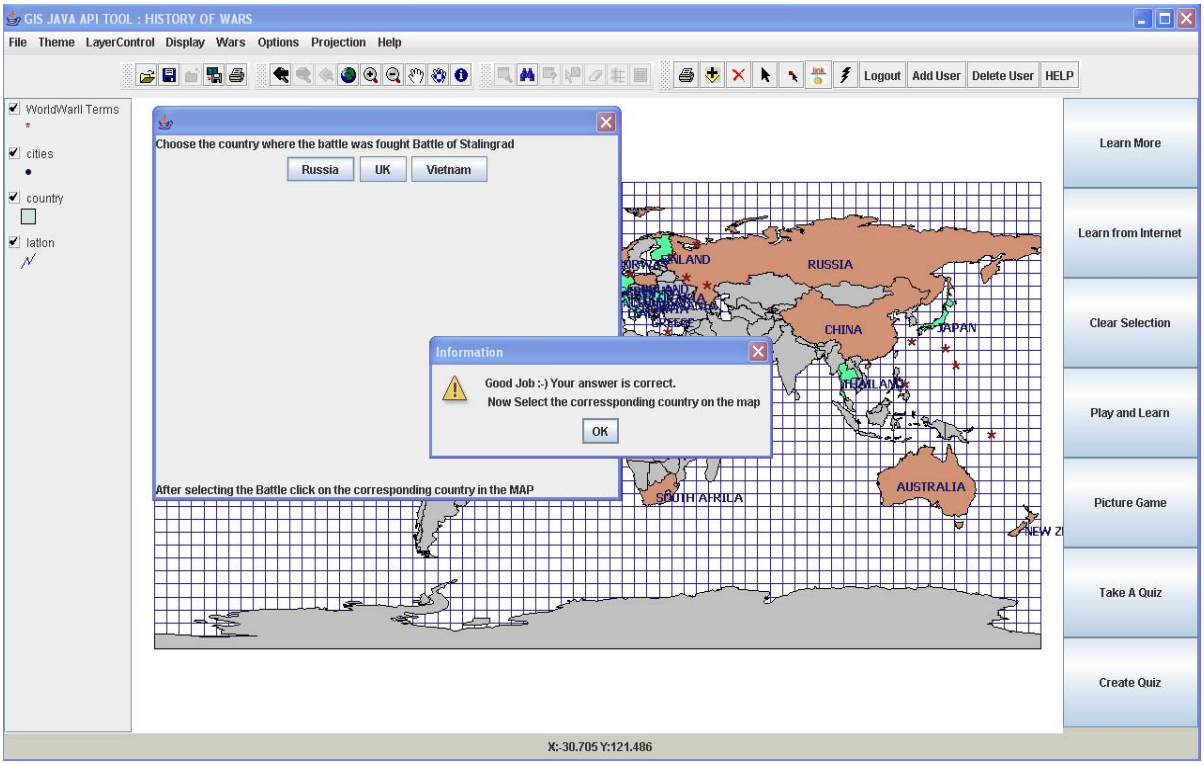

Figure 11.32. Play N Learn - 1.

11.9 HIDE OPTIONS PANEL

On the Default Map view, click on the Options Menu and select the Remove options panel menu list (see Figure 11.35). The panel will be removed from the map. Click the Zoom to full extent button to re-size the map to default.

11.10 WARS MENU

Wars Menu option allows the user to switch wars from the Default Map view (see Figures 11.36 and 11.37). Once the user selects war countries, battle sites are displayed for that particular war.

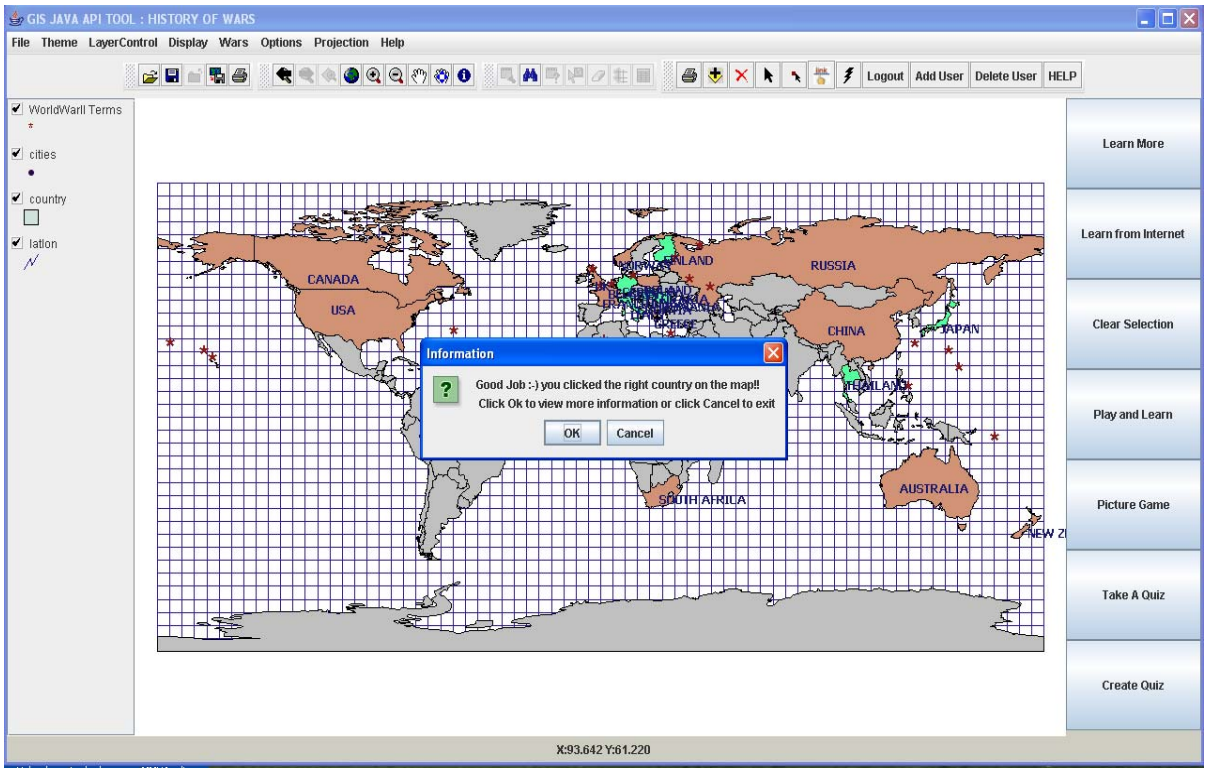

Figure 11.33. Play N Learn - 2.

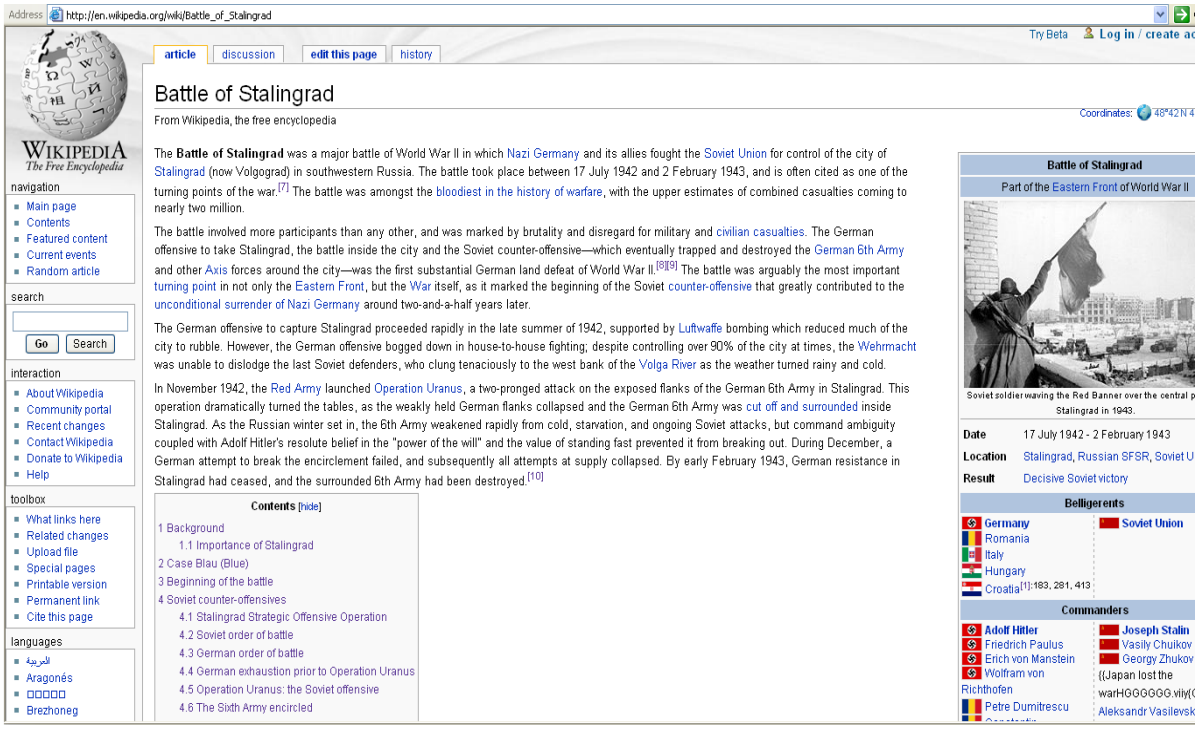
http://en.wikipedia.org/wiki/Battle_of_Stalingrad
article
discussion
edit this page
history
Battle of Stalingrad
From Wikipedia, the free encyclopedia
The Battle of Stalingrad was a major battle of World War II in which Nazi Germany and its allies fought the Soviet Union for control of the city of Stalingrad (now Volgograd) in southwestern Russia.
Contents [hide]
Battle of Stalingrad
Part of the Eastern Front of World War II
Belligerents
Commanders

Figure 11.34. Play N Learn more information page.

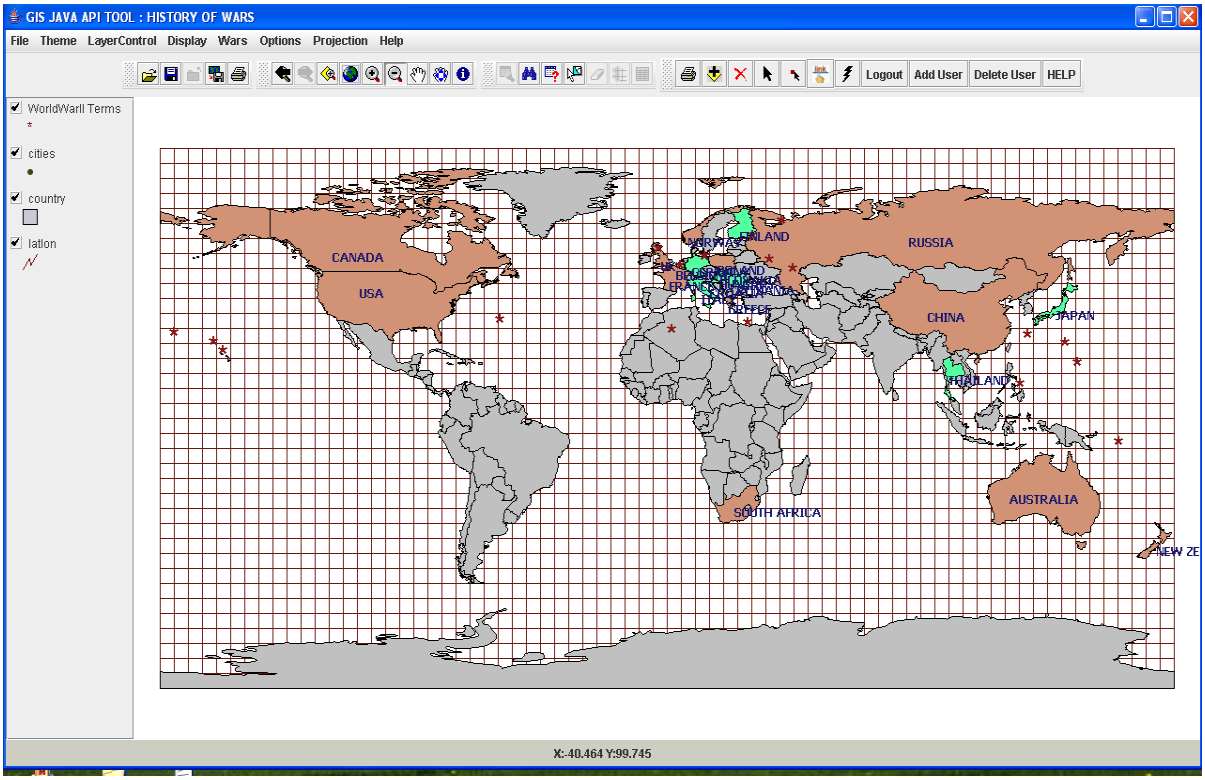

Figure 11.35. Hide options panel.

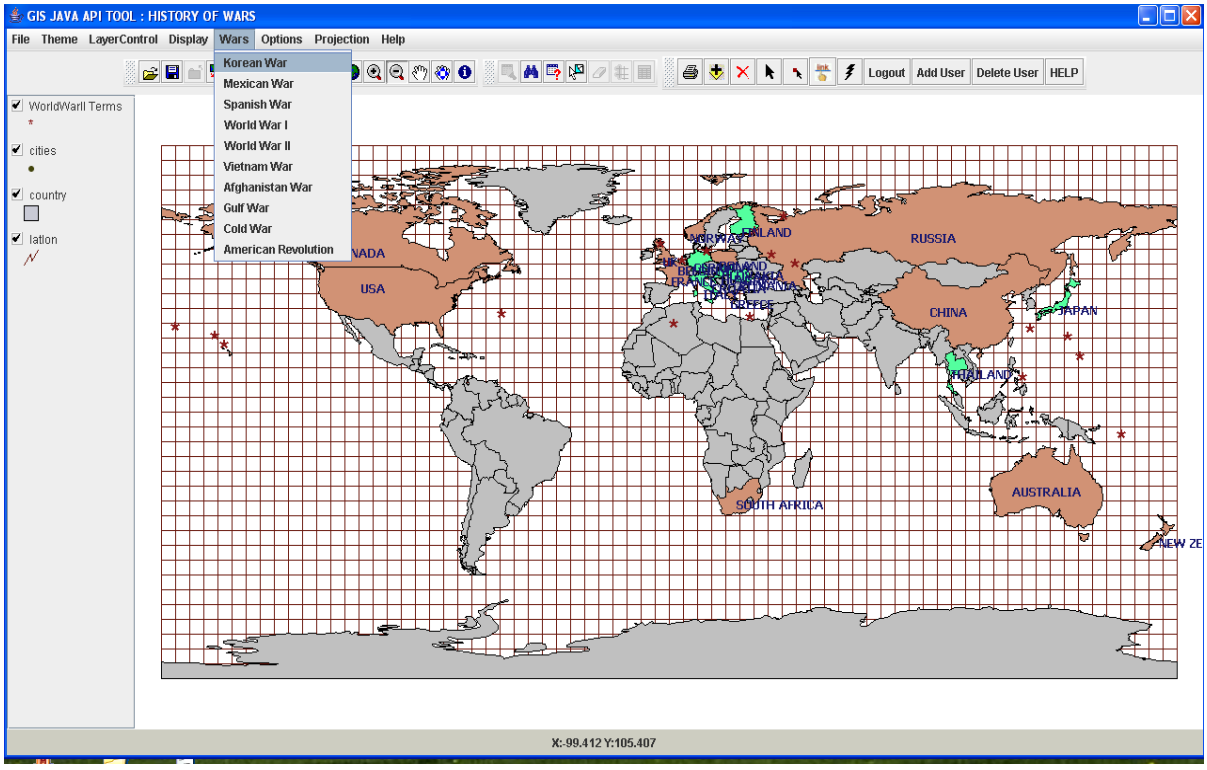

Figure 11.36. Wars menu - 1.

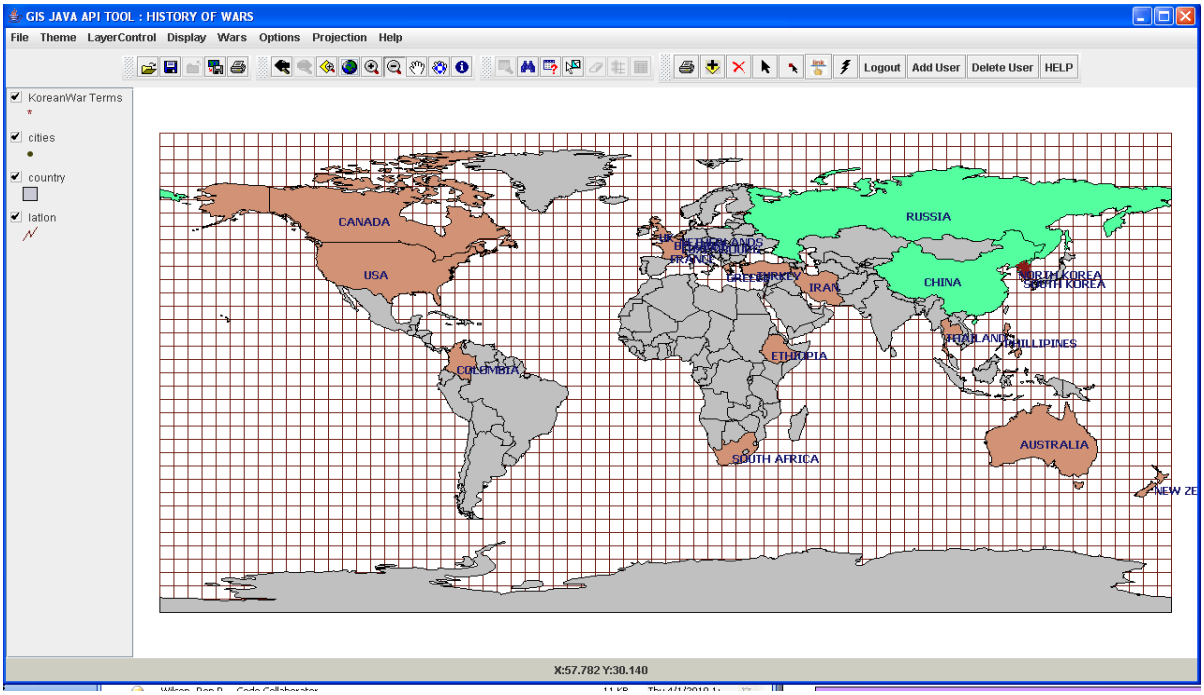

Figure 11.37. Wars menu - 2.

11.11 DISPLAY MENU

Display Menu has the following options displayed (see Figure 11.38).

11.11.1 Display Battle Sites

Display Battle Sites options displays the all the battle sites for the war selected (see Figure 11.39). This option makes it easier to select the battle to be viewed. This option is disabled when the default map view loads. This option becomes enabled when the user selects this option. . It again becomes disabled when the user clicks the clear battle sites option.

11.11.2 Display Battle Site Names in Bold

The user selects the Display Battle Sites in Bold option to enhance visibility for the user as the battle sites are displayed in bold font. (see Figure 11.40).

11.11.3 Clear Battle Sites

This option clears the battle names for the battle sites on the map (see Figure 11.41). The option is disabled when the default map view loads. This option becomes enabled when the user selects Display battle sites option.

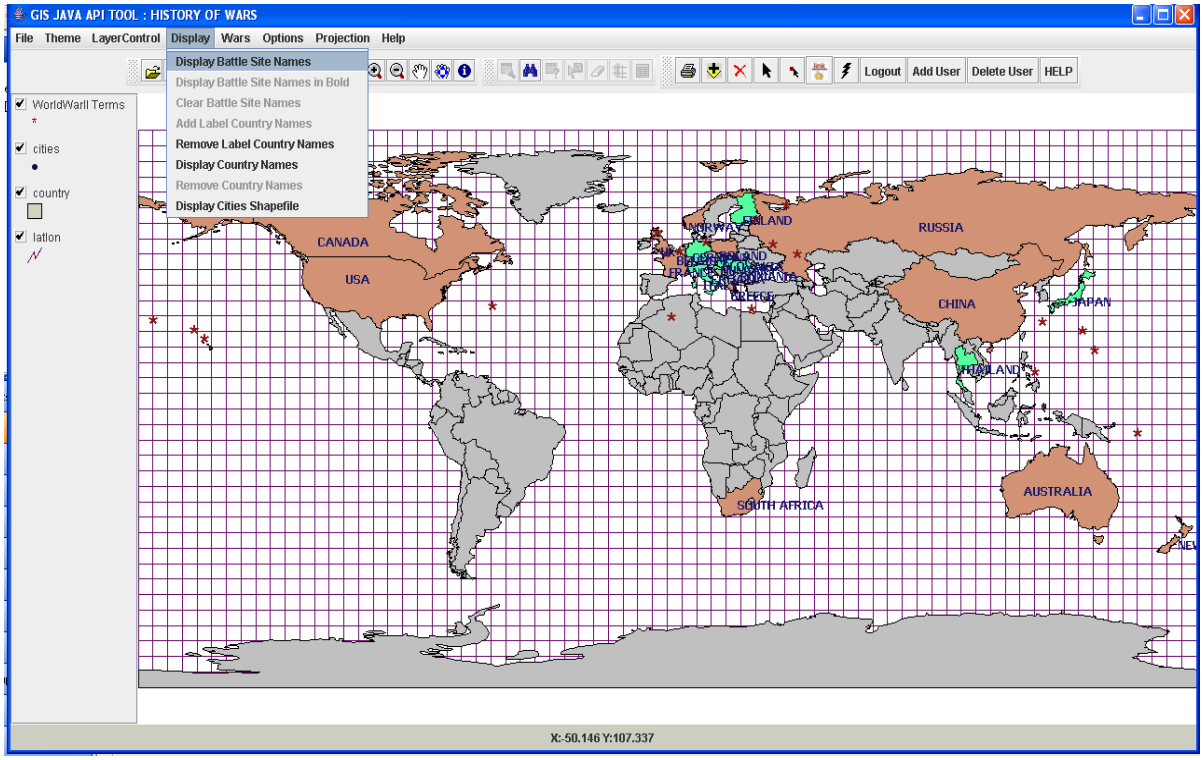

Figure 11.38. Display menu.

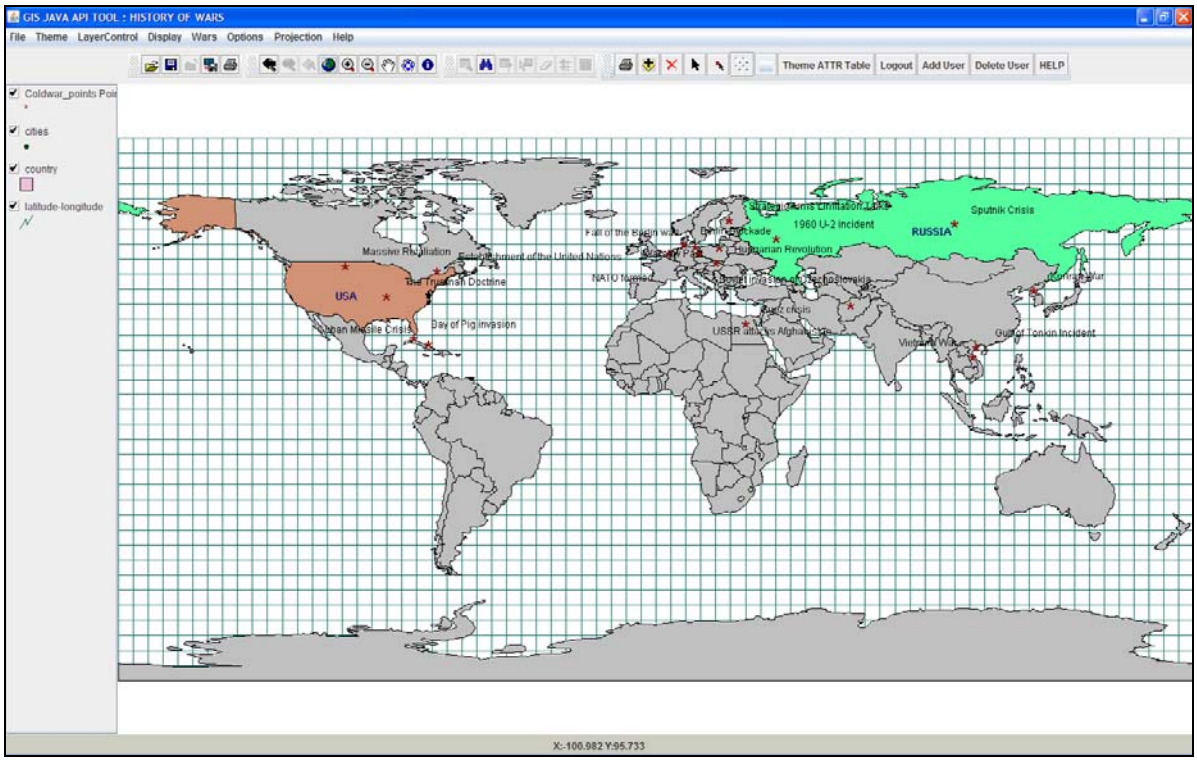

Figure 11.39. Wars menu – display battle sites option.

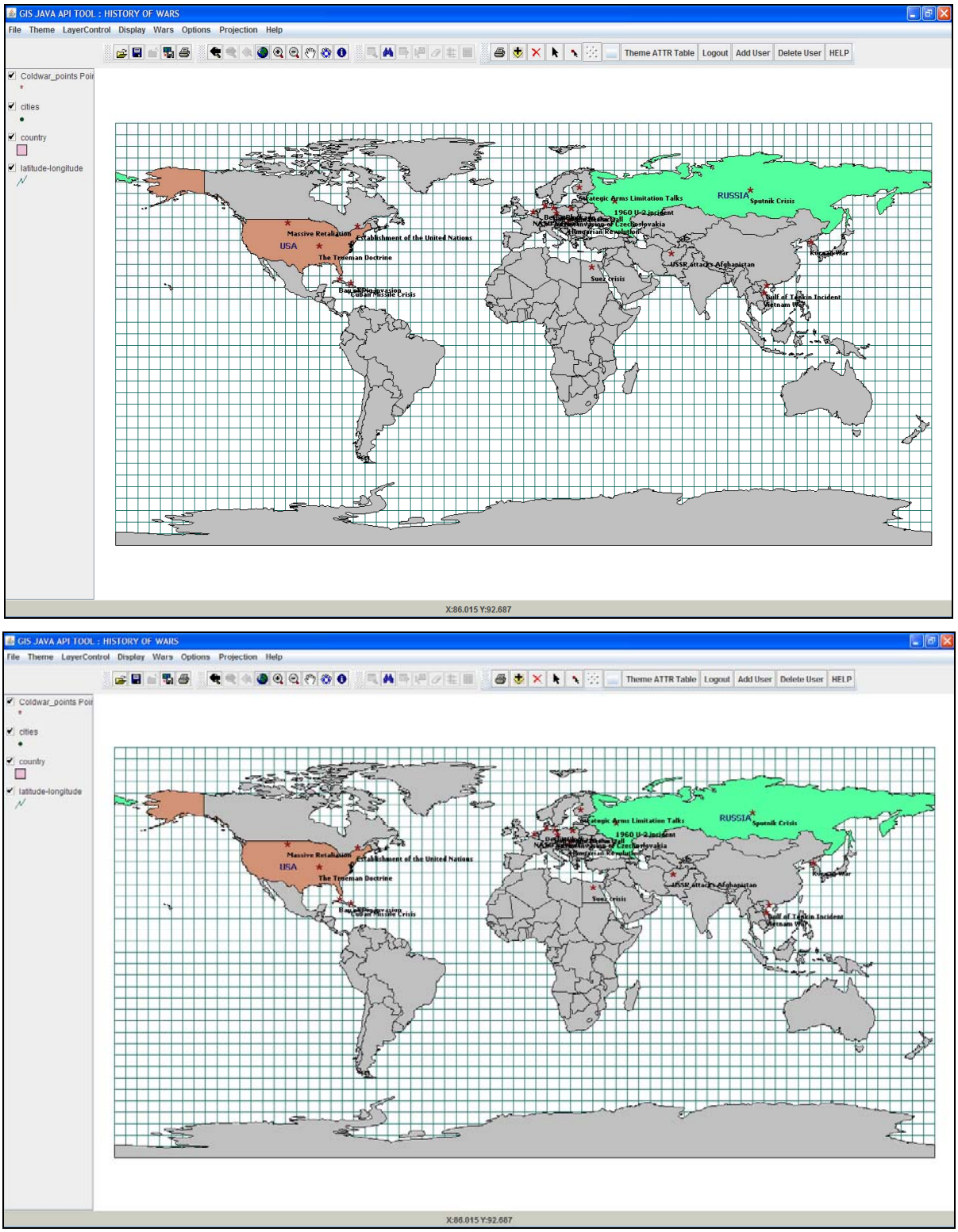

Figure 11.40. Wars menu – display battle sites in bold option.

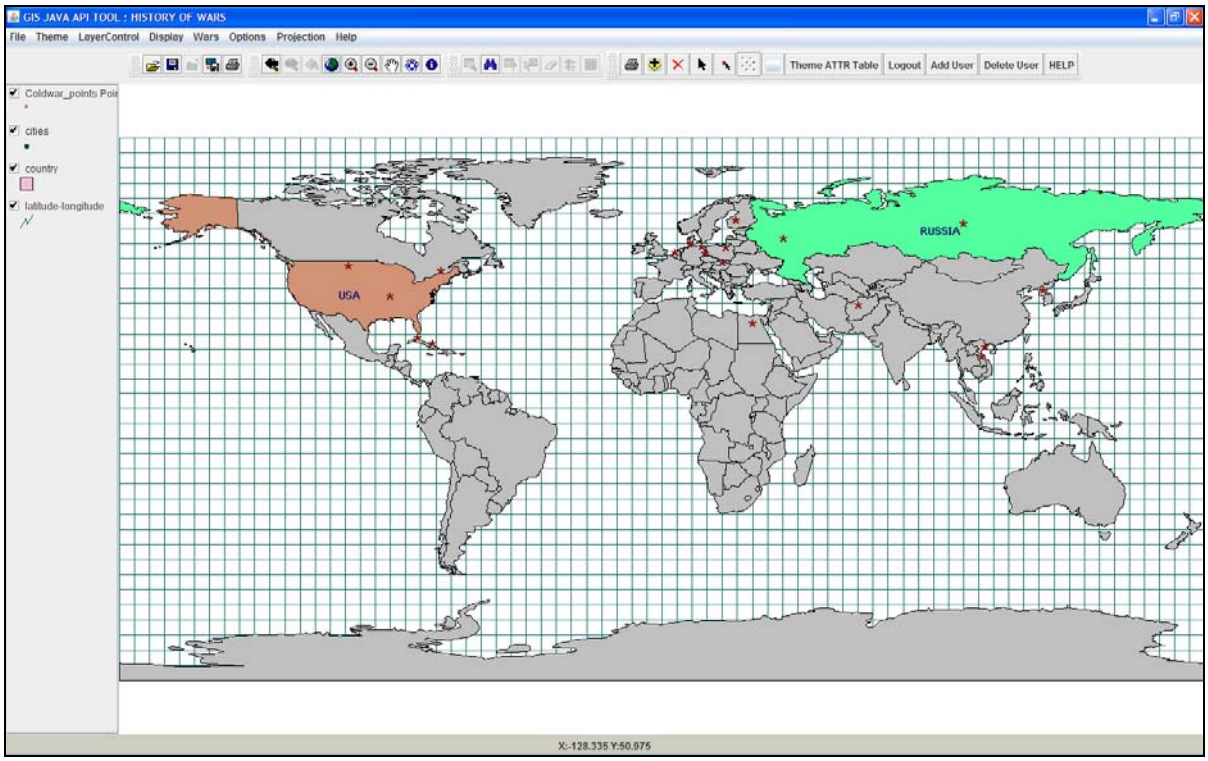

Figure 11.41. Wars menu – clear battle sites option.

11.11.4 Remove Label Country Names

This option removes the Country names who participated in the war from the map (see Figure 11.42). This option is enabled when default map view loads. This option becomes disabled when the user selects this option.

11.11.5 Add Label Country Names

This option displays the Country names who participated in the war (see Figure 11.43). When the default map view loads this option is disabled. This option becomes enabled when the user selects Remove Label Names option.

11.11.6 Display Cities Shape File

The user wants adds the Cities shape file on the map with this option (see Figure 11.44). De-select the checkbox of cities from table of contents panel to remove the cities shapefile from the map.

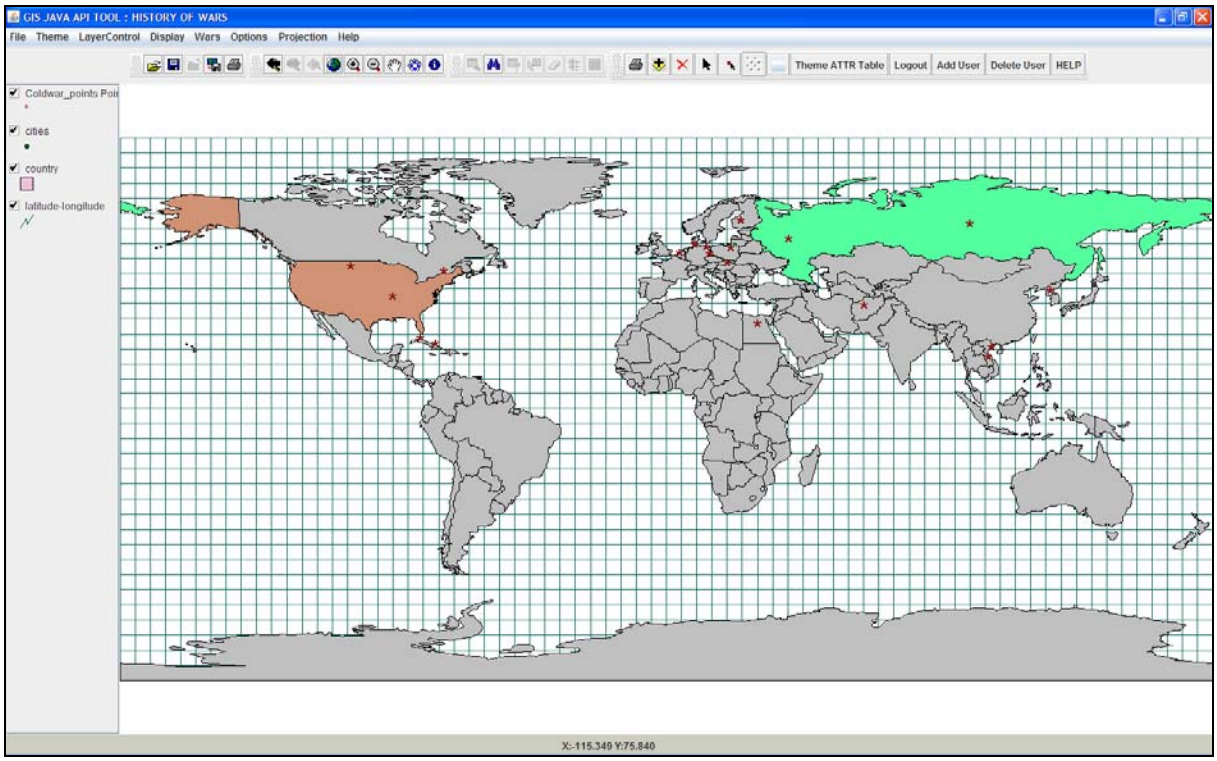
GIS JAVA API TOOL : HISTORY OF WARS
File Theme LayerControl Display Wars Options Projection Help
Theme ATTR Table Logout Add User Delete User HELP
Coldwar_points Poi
cities
country
latitude-longitude
X:-115.349 Y:75.840

Figure 11.42. Wars menu – remove label country names option.

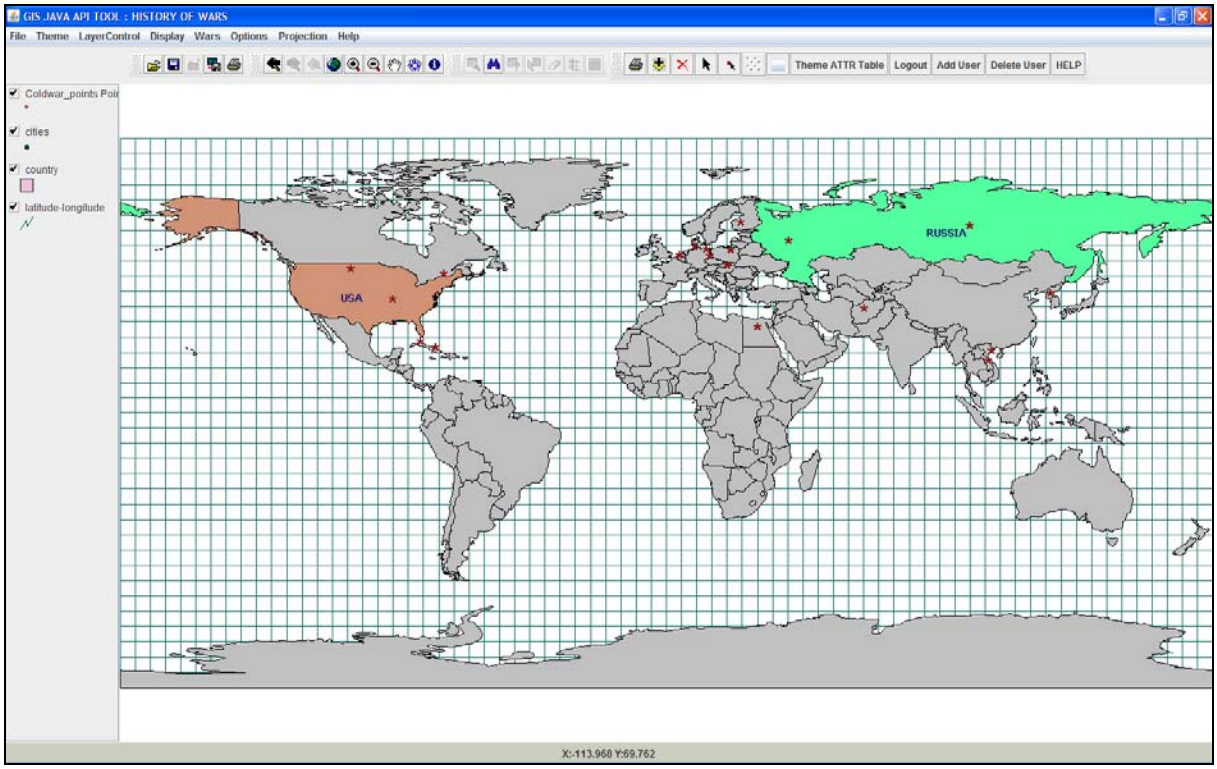

Figure 11.43. Wars menu – add label country names option.

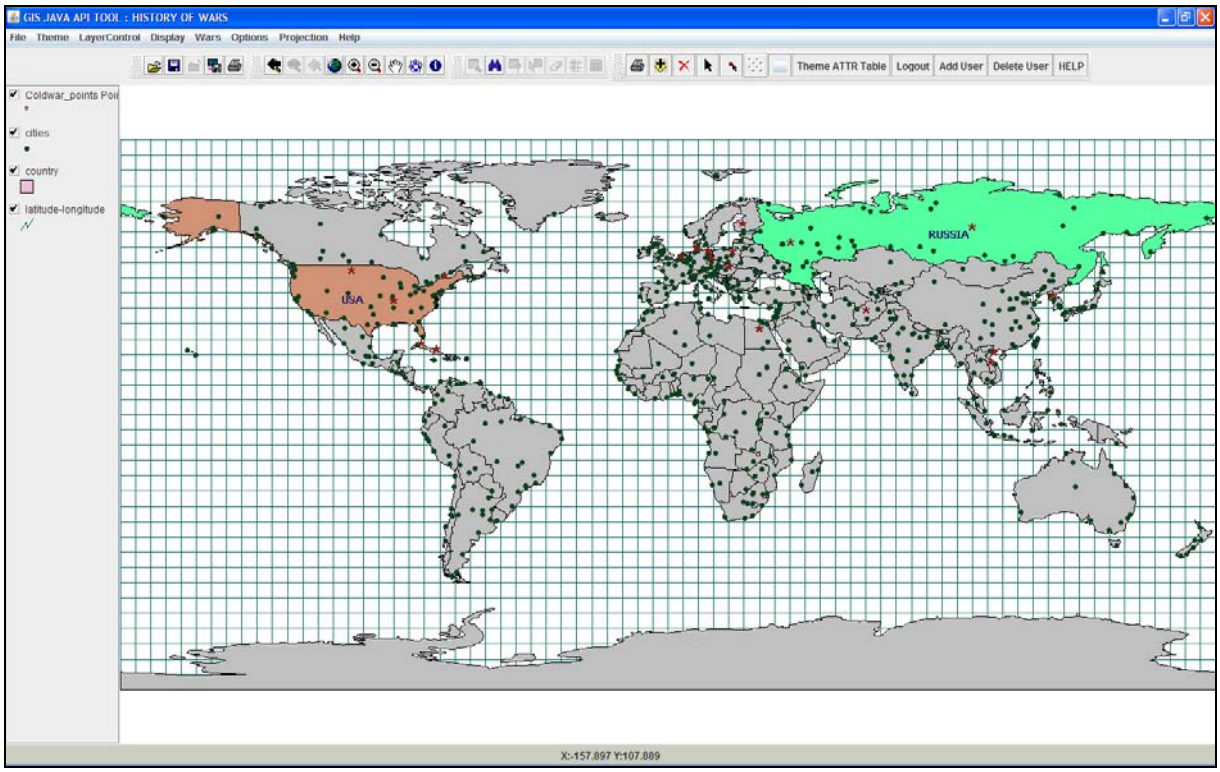

Figure 11.44. Wars menu – display cities shapefile option.

11.11.7 Display Country Names

This option displays all the countries on the map. The option can be helpful when the user wants to know countries for the battle sites on the map (See Figure 11.45).

11.11.8 Remove Country Names

Clear the country names from the map with this option (see Figure 11.46). However the country names of the participants of the war remains.

11.12 HELP MENU

Help Menu on the Default Map View is used to provide help to the users in case they are stuck and how to use toolbars and menu options on the map. The Help Menu has the following options:

The Help Window provides important information about how to use toolbar options. This option displays the help window for using the toolbar options (see Figure 11.47).

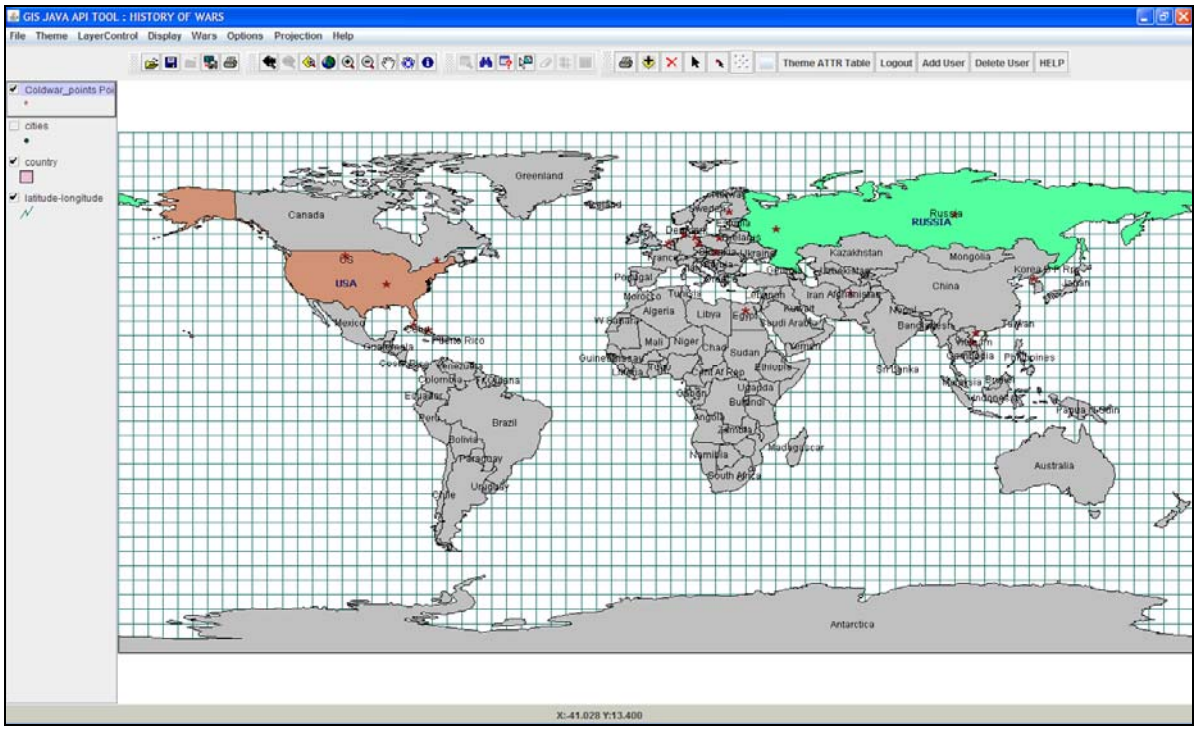

Figure 11.45. Wars menu – display country names option.

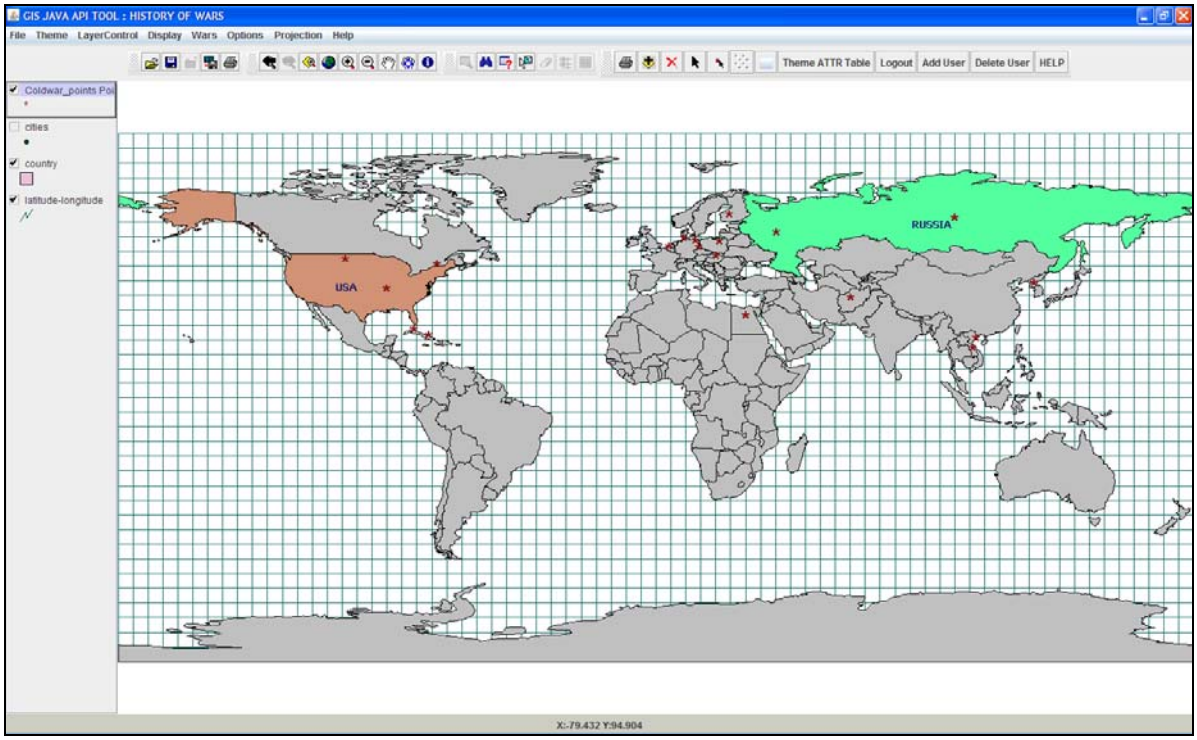

Figure 11.46. Wars menu – remove country names option.

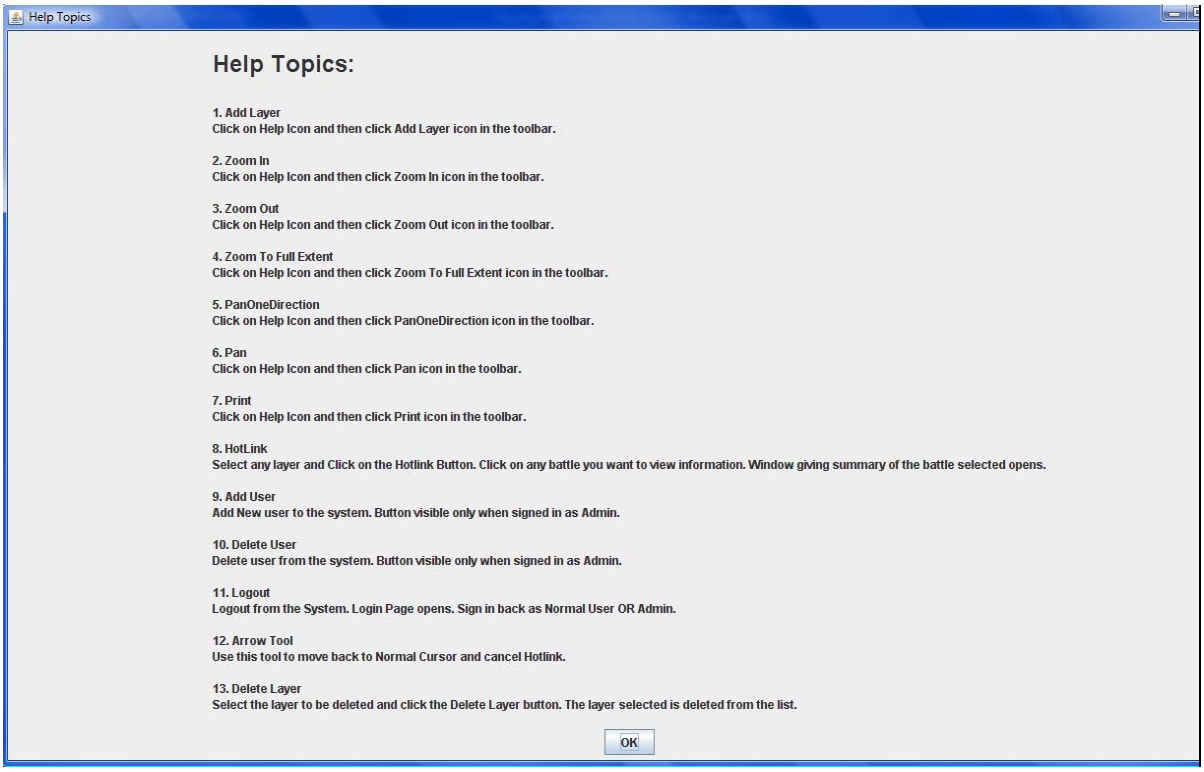
Help Topics
Help Topics:
1. Add Layer
Click on Help Icon and then click Add Layer icon in the toolbar.
2. Zoom In
Click on Help Icon and then click Zoom In icon in the toolbar.
3. Zoom Out
Click on Help Icon and then click Zoom Out icon in the toolbar.
4. Zoom To Full Extent
Click on Help Icon and then click Zoom To Full Extent icon in the toolbar.
5. PanOneDirection
Click on Help Icon and then click PanOneDirection icon in the toolbar.
6. Pan
Click on Help Icon and then click Pan icon in the toolbar.
7. Print
Click on Help Icon and then click Print icon in the toolbar.
8. HotLink
Select any layer and Click on the Hotlink Button. Click on any battle you want to view information. Window giving summary of the battle selected opens.
9. Add User
Add New user to the system. Button visible only when signed in as Admin.
10. Delete User
Delete user from the system. Button visible only when signed in as Admin.
11. Logout
Logout from the System. Login Page opens. Sign in back as Normal User OR Admin.
12. Arrow Tool
Use this tool to move back to Normal Cursor and cancel Hotlink.
13. Delete Layer
Select the layer to be deleted and click the Delete Layer button. The layer selected is deleted from the list.
OK

Figure 11.47. Help window.

11.13 TOOLBAR BUTTON HELP

To know the functionality of each toolbar on the map, the user selects the help button and clicks on the toolbar for which information is required. A pop-up window displaying how to use the toolbar button is opened (see Figure 11.48). For e.g. For Zoom In button the following window is displayed.

11.14 FILE MENU

On the Default Map View the user performs the following operation with the File Menu.

11.14.1 Add Layer

Selecting the Add layer button and browsing to the shape file you want to add to the map the user adds the layer to the map (see Figure 11.49).

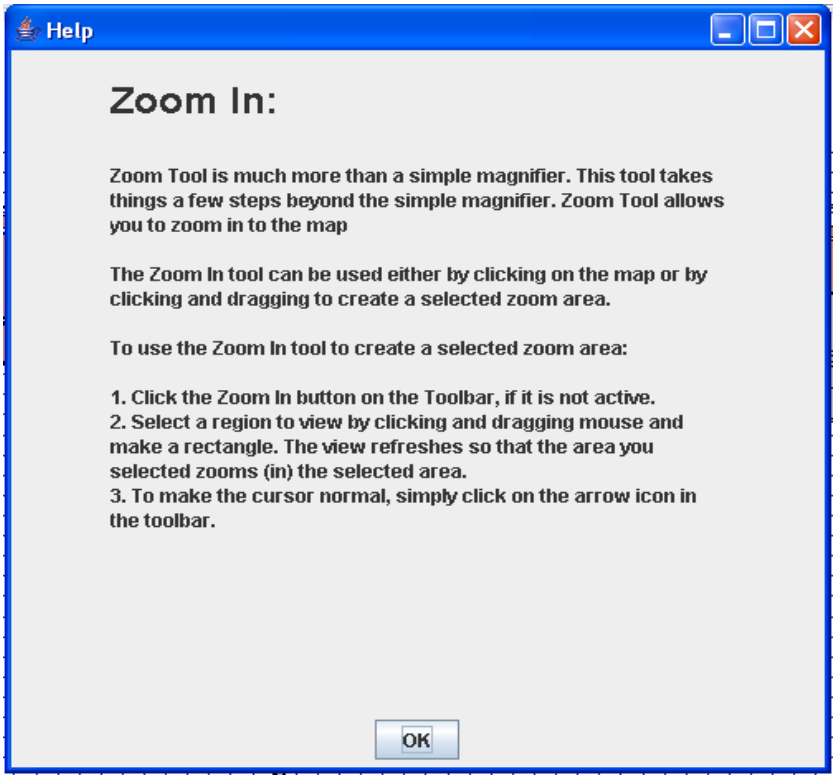
Help
Zoom In:
Zoom Tool is much more than a simple magnifier. This tool takes things a few steps beyond the simple magnifier. Zoom Tool allows you to zoom in to the map
The Zoom In tool can be used either by clicking on the map or by clicking and dragging to create a selected zoom area.
To use the Zoom In tool to create a selected zoom area:
1. Click the Zoom In button on the Toolbar, if it is not active.
2. Select a region to view by clicking and dragging mouse and make a rectangle. The view refreshes so that the area you selected zooms (in) the selected area.
3. To make the cursor normal, simply click on the arrow icon in the toolbar.
OK

Figure 11.48. Tool bar button help.

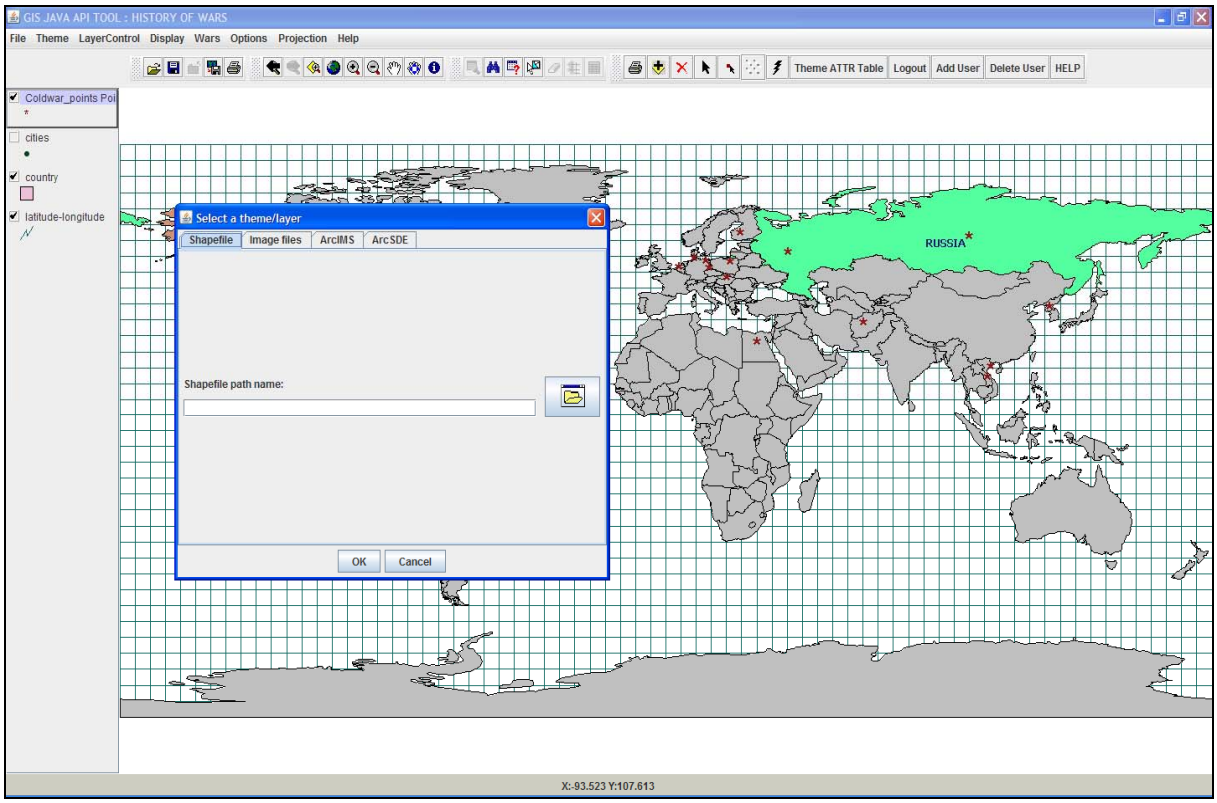

Figure 11.49. Add layer option.

11.14.2 Print

Click the Print option and the system would open a print dialog (see Figure 11.50). Select the printer to be used and print the map.

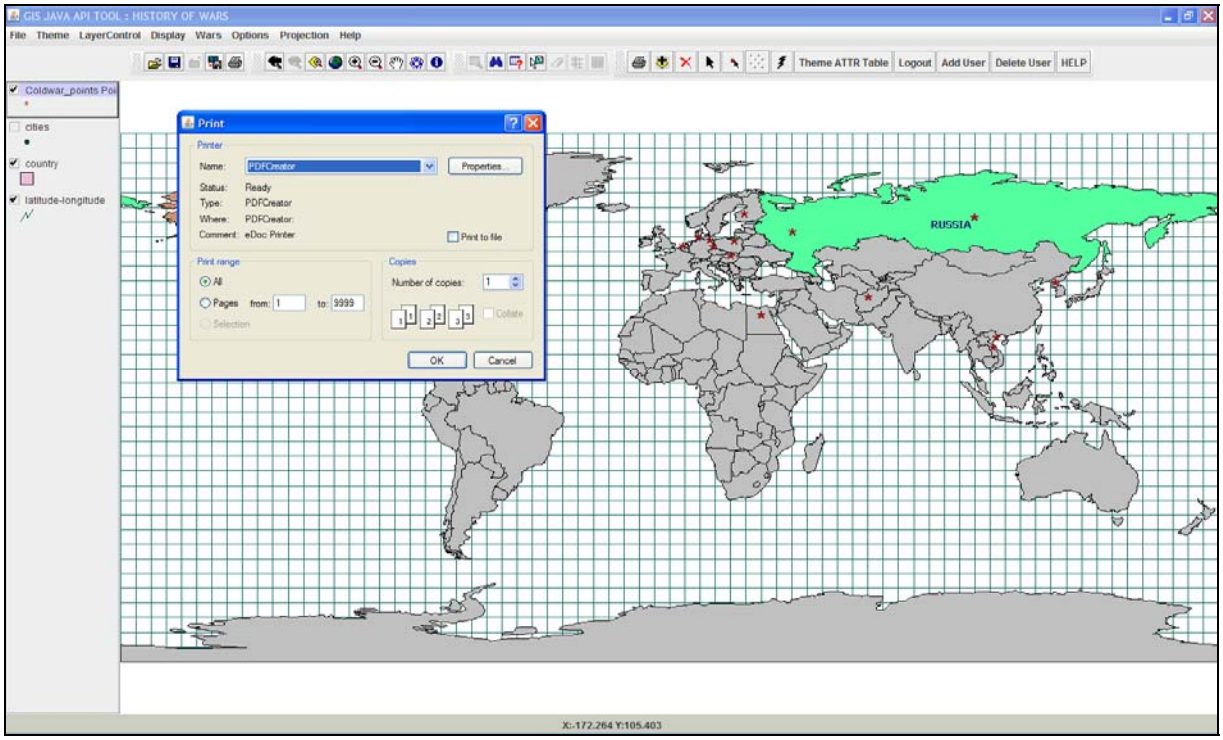

Figure 11.50. Print map option.

11.14.3 Remove Layer

Select the layer to be removed from the map and click the Remove layer button to remove the later from the map (see Figure 11.51). The layer can be added to the map by using the Add Layer option. If the war shape file is removed, click on the wars menu and select one of the wars from the list.

11.14.4 Legend Editor

To change the Style and color schemes for the shapefile from the table of contents panel the user can use the Legend Editor option (see Figure 11.52).

11.15 EDIT MENU

Select a layer and click Open Attribute table option (see Figures 11.53 and 11.54). Attribute table for that particular layer is displayed.

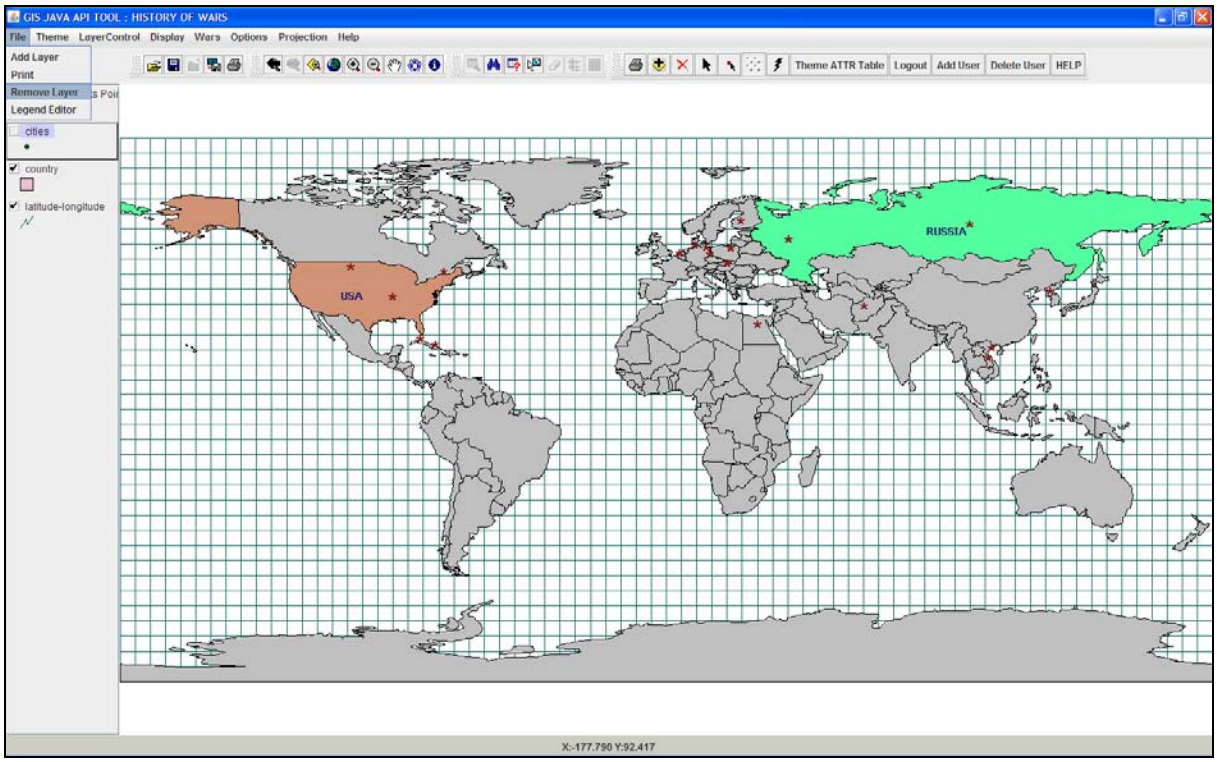

Figure 11.51. Remove layer option.

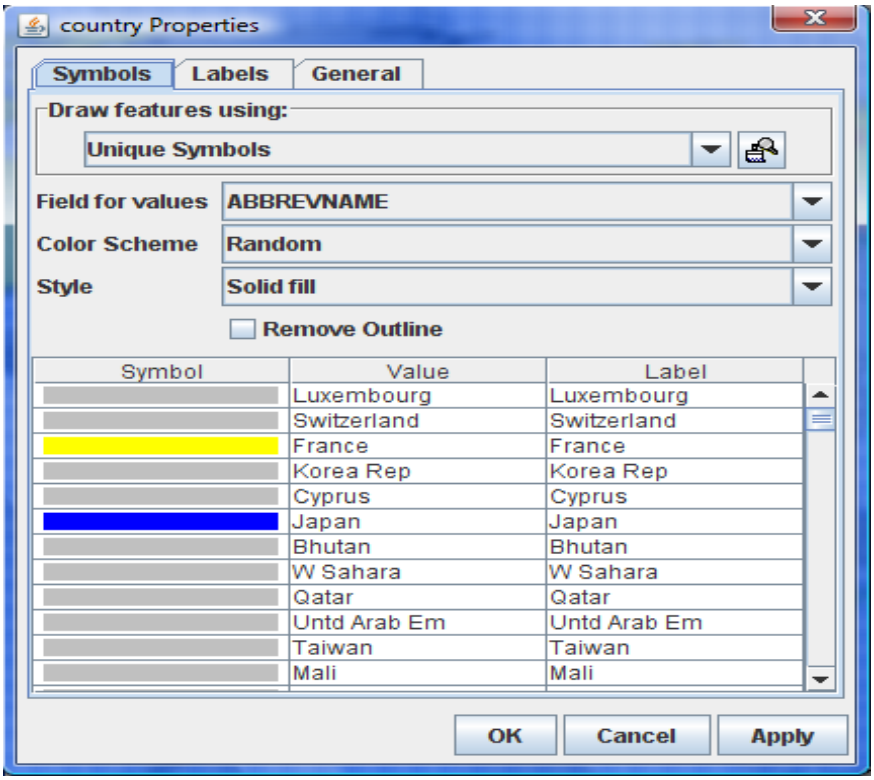

Figure 11.52. Legend editor option.

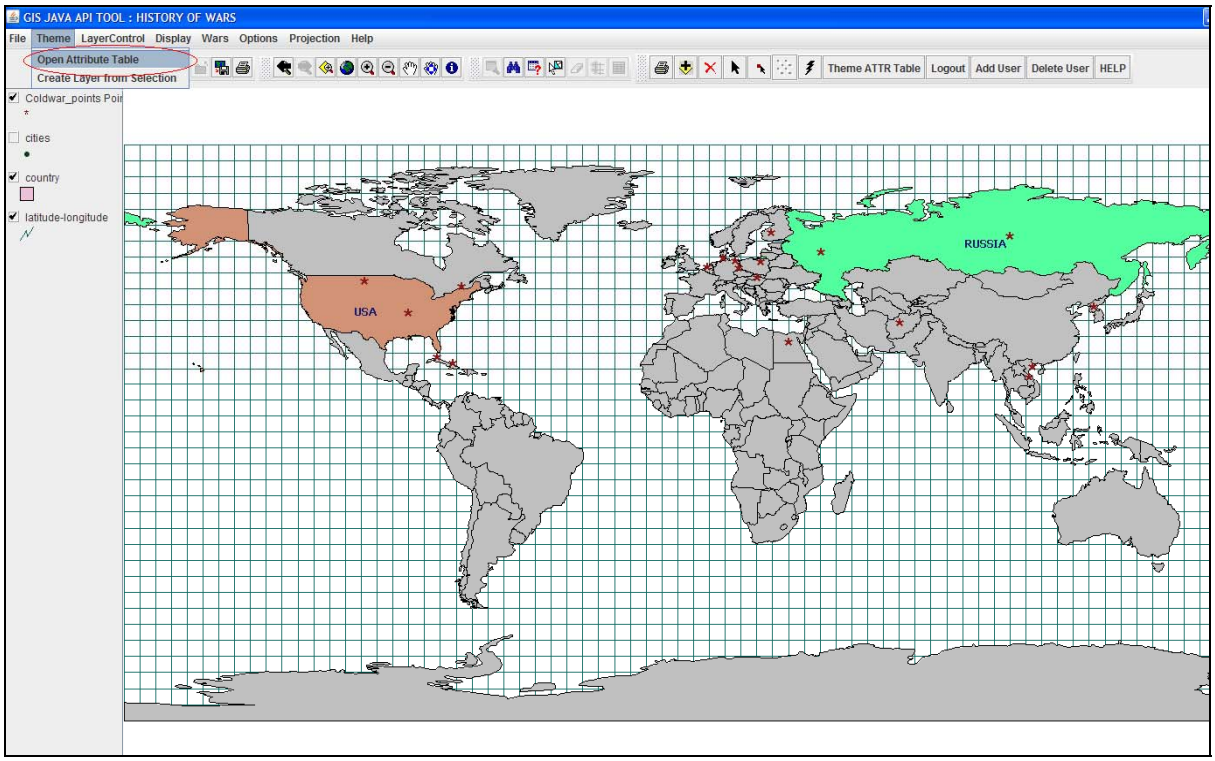

Figure 11.53. Open attribute table option.

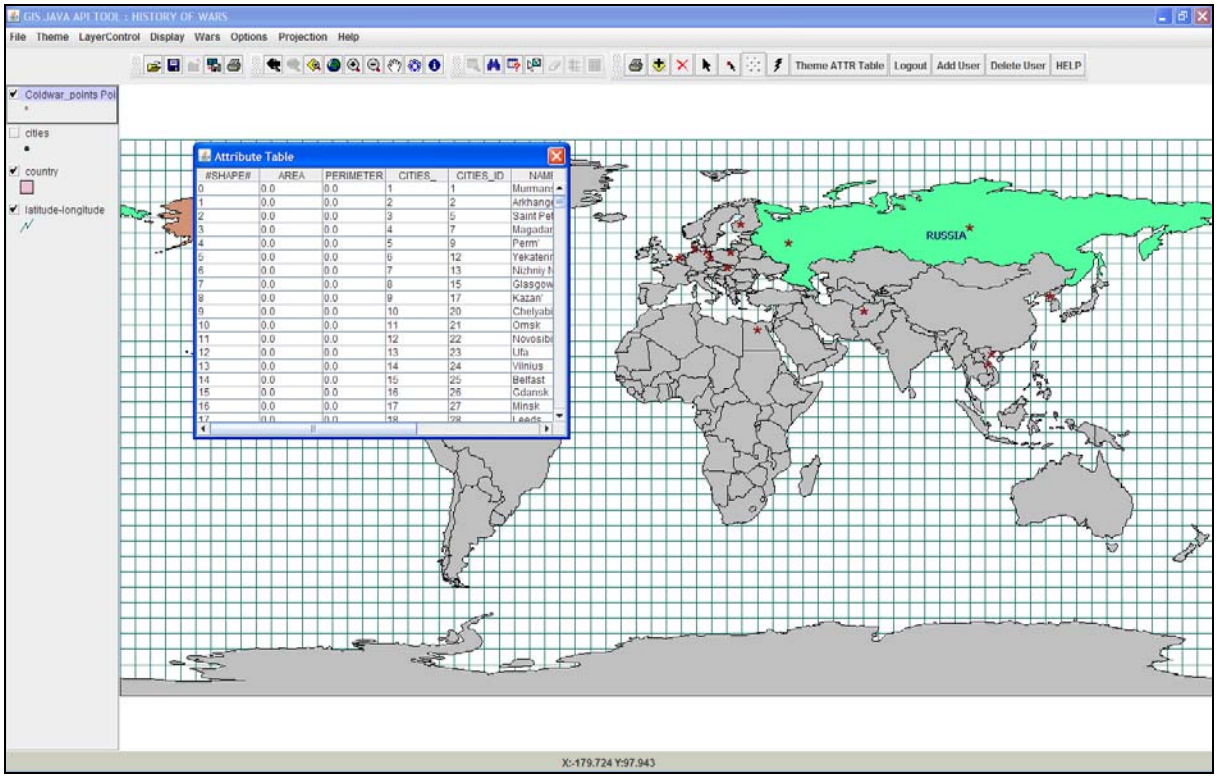

Figure 11.54. LayerControl menu option.

11.16 CHANGE PROJECTION

To change the projection of the map click the Projection Menu and select the Change Projection option. Select the custom tab and select any of the projections from the Projection drop-down list. Map with the projection selected will be displayed on the screen (see Figures 11.55 and 11.56).

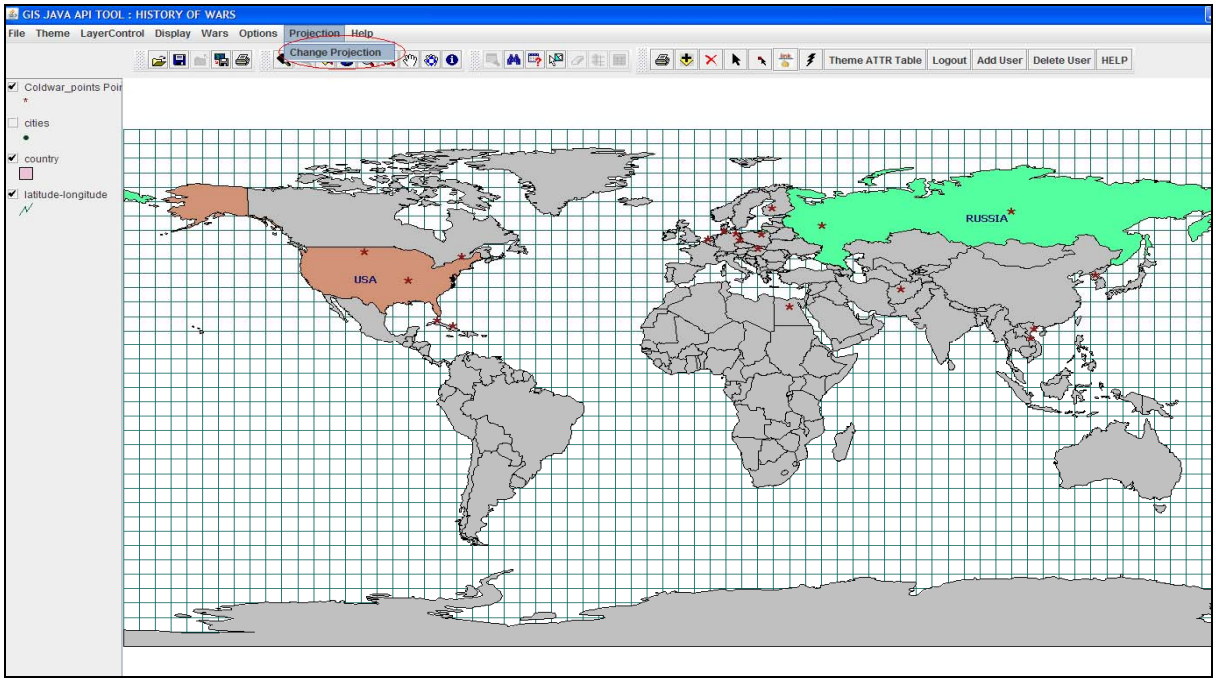

Figure 11.55. Change projection - 1.

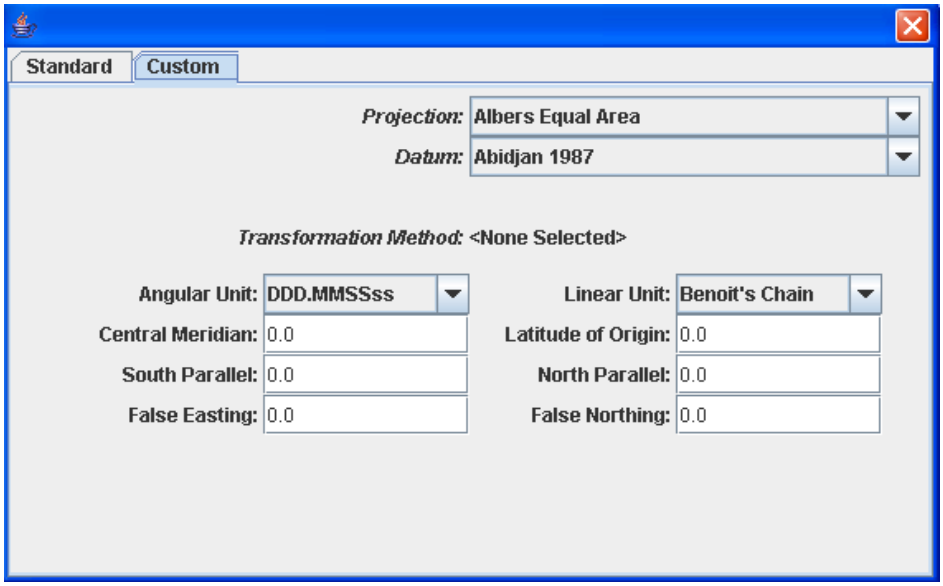

Figure 11.56. Change projection - 2.

CHAPER 12

FUTURE ENHANCEMENT

This GIS tool provides can be extended to support more features and use cases. Since the tool is developed using java the classes can be reused and extra features can be added easily and with minimal coding. There is a lot of scope for future enhancements to the tool.

Some of the possible future enhancements proposed are:

- The application can be modified to cover other battles for each war. For each war only the major battles have been covered.
- The GIS Tool covers major battles fought between 1775 to Present. The GIS Tool can be extended to involve other wars fought in this period.
- Also, time-based quiz functionality can be added along with better GUI for the quiz.
- The quiz section could be modified to provide more functionality.
- Picture Game has been added to the system. More interactive games and puzzles can be added to make learning more interactive and enjoyable.
- Deploying the application on the web, so that it can be used without installing it on each machine.
- Providing animation for the timeline of the wars, showing each battle as it occurred one-by-one.
- More features can be added like time-travel functionality to show the timeline of the events happening throughout the time.
- Adding the capability to change the projection of the Map.

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